
SUPREME COURT OF THE STATE OF NEW YORK
APPELLATE DIVISION: FIRST DEPARTMENT

THE PEOPLE OF THE STATE OF NEW YORK,

Respondent,

-against-

JEFFREY E. EPSTEIN,

Defendant-Appellant.

AFFIRMATION IN RESPONSE TO NON-PARTY MOTION

N.Y. County Ind. No. 30129/10

Cal. Date: December 31, 2018

CYRUS R. VANCE, JR.
District Attorney
New York County
One Hogan Place
New York, New York 10013
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Karen Friedman Agnifilo
Assistant District Attorney
Of Counsel

EXHIBIT F

From: Martin G. Weinberg <owlmgw@att.net>
Sent: Thursday, January 03, 2019 8:14 AM
To: Browning, Jack; 'Maksim Nemtsev'
Cc: Balin, Robert; owlmgw@att.net
Subject: RE: Motion to Unseal Epstein Appeal Briefs

[EXTERNAL]

Jack, after consideration of your request for the unsealing of the appellate briefs with redactions of certain identities, we take no position on behalf of Mr Epstein. I appreciate your courtesy in providing me with more time to respond given the holidays. Let me know if this email suffices. Thanks, Marty

Martin G. Weinberg, Esq.
20 Park Plaza, Suite 1000
Boston, MA 02116
off - 617 227 3700
fax - 617 338 9538
cell - 617 901 3472

==================================
This Electronic Message contains information from the Law Office of Martin G. Weinberg, P.C., and may be privileged. The information is intended for the use of the addressee only. If you are not the addressee, please note that any disclosure, copying, distribution, or use of the contents of this message is prohibited.

From: Browning, Jack [mailto:JackBrowning@dwt.com]
Sent: Thursday, December 27, 2018 10:13 AM
To: Martin G. Weinberg <owlmgw@att.net>; 'Maksim Nemtsev' <menemtsev@gmail.com>
Cc: Balin, Robert <robertbalin@dwt.com>
Subject: RE: Motion to Unseal Epstein Appeal Briefs

Marty,

Please find attached a scan of the signed signature page.

Best regards,

Jack

From: Martin G. Weinberg <owlmgw@att.net>
Sent: Thursday, December 27, 2018 8:55 AM
To: Browning, Jack <JackBrowning@dwt.com>; 'Maksim Nemtsev' <menemtsev@gmail.com>
Cc: Balin, Robert <robertbalin@dwt.com>; owlmgw@att.net
Subject: RE: Motion to Unseal Epstein Appeal Briefs

[EXTERNAL]

Jack, my local counsel in NY (we are filing for pro hac vice) has advised that the Court Clerk may require a signature on the Stipulaion. Out of an abundance of caution, can you sign and return and we will file today. Thanks, Marty

From: Browning, Jack [mailto:JackBrowning@dwt.com]
Sent: Wednesday, December 26, 2018 12:19 PM
To: Maksim Nemtsev <menemtsev@gmail.com>
Cc: Martin G. Weinberg <owlmgw@att.net>; Balin, Robert <robertbalin@dwt.com>
Subject: RE: Motion to Unseal Epstein Appeal Briefs

Maksim,

Please find attached a copy of the stipulation with some minor edits, which you can go ahead and file/serve. If you do ultimately file an opposition, please serve us with copies via email.

Best regards and happy holidays,

Jack

From: Maksim Nemtsev <menemtsev@gmail.com>
Sent: Wednesday, December 26, 2018 10:33 AM
To: Browning, Jack <JackBrowning@dwt.com>
Cc: Martin G. Weinberg <owlmgw@att.net>
Subject: Motion to Unseal Epstein Appeal Briefs

[EXTERNAL]

Hi Jack,

Attached is a draft Stipulation to adjourn the return date to January 7, 2019. Answering papers will be due January 4 and reply papers will be due January 6.

We are also enlisting the assistance of local counsel to sponsor Marty's pro hac vice petition. We will provide you with copies of the motion papers once they are prepared.

Let me know if you have any questions. Happy Holidays.

Thank you,
Max Nemtsev
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Boston, MA 02116
(617) 227-3700
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EXHIBIT G

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January 4, 2019

FILED
JAN 4 2019
SUP COURT APP. DIV.
FIRST DEPT.

VIA HAND DELIVERY

Clerk of Court
Supreme Court of the State of New York
Appellate Division, First Department
27 Madison Avenue
New York, NY 10010

Re: Motion to Unseal Briefs (with Names of Victims Redacted) in *People v. Epstein*, N.Y. Co. Index No. 30129/10 (Appellate Division No. 6081)

Dear Sir or Madam:

We write on behalf of non-party movant NYP Holdings, Inc., publisher of the New York Post (the "Post"), to withdraw the motion filed by the Post on December 21, 2018 seeking an order to unseal the briefs submitted by the parties in the above-captioned appeal (with the names of victims redacted). Pursuant to NYCRR § 1250.2, we write to inform the Court that the Post hereby withdraws its pending motion without prejudice and expressly reserves the right to refile the motion. *See* NYCRR § 1250.2(a) ("Withdrawal of Motion. A moving party may file a written request to withdraw a motion at any time prior to its determination").

The Post intends to refile its motion for an order unsealing the briefs (with appropriate redactions), but has withdrawn its pending motion in response to an affidavit submitted by the office of the Manhattan District Attorney on December 28, 2018. That affidavit asserts that the Post was required, but failed, to provide notice of the unsealing motion to "prosecutor's offices in Florida" before proceeding with its motion. While the Post firmly believes that it satisfied its obligations by serving the Manhattan District Attorney's office with a copy of its unsealing motion, it wishes to avoid and moot any dispute with the District Attorney's office over whether the notice requirements of the relevant statute were met. Accordingly, the Post will refile its motion to unseal next week and, at that time, will serve its motion papers on the relevant Florida prosecutors, as well as on the parties to the appeal.

Respectfully yours,

Davis Wright Tremaine LLP

Robert D. Balin

cc: Assistant District Attorney Karen Friedman Agnifino (by email)
Martin G. Weinberg, Esq. (by email)

SUPREME COURT OF THE STATE OF NEW YORK
APPELLATE DIVISION – FIRST DEPARTMENT

THE PEOPLE OF THE STATE OF NEW YORK, Respondent, - against - JEFFREY E. EPSTEIN, Defendant-Appellant.	App. Div. No. 6081 On Appeal from New York Supreme Court, New York County, Index No. 30129/10 (Pickholz, J.)

MEMORANDUM OF LAW IN SUPPORT OF MOTION BY NYP HOLDINGS, INC TO UNSEAL APPELLATE BRIEFS

DAVIS WRIGHT TREMAINE LLP

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Counsel for Non-Party Movant NYP Holdings, Inc.

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Non-party movant NYP Holdings, Inc., publisher of the *New York Post* (the "Post"), respectfully submits this memorandum of law in support of its motion, filed pursuant to 22 NYCRR § 1250.1(e)(3) and N.Y. Civil Rights Law § 50-b(2)(b), for an order unsealing the briefs filed by the parties in the above-captioned appeal (the "Appeal") with the names of victims of sex crimes redacted.

PRELIMINARY STATEMENT

The Post seeks to unseal court documents that will shed light on why the Manhattan District Attorney's Office initially sought lenient treatment of billionaire financier and convicted pedophile Jeffrey Epstein. In 2008, Epstein pled guilty to soliciting prostitution from a minor, but there has been suspicion since that time – voiced by members of the judiciary and the press alike – that prosecutors gave Epstein preferential treatment because of his wealth and his political connections to powerful men like Donald Trump, Bill Clinton, and Prince Andrew. The handling of criminal proceedings against Epstein by federal prosecutors in Florida and thereafter by the Manhattan District Attorney's office has come under renewed scrutiny after the *Miami Herald* published a series of investigative articles beginning November 28, 2018, including an article reporting recently that "prosecutors worked to cut him a break" despite strong evidence that he had abused 80 girls and young women.

As part of its own news reporting on the New York proceedings against Epstein, the Post seeks to unseal the briefs filed in this Appeal, in which this Court held that Epstein had to register as a level three sex offender in New York, which is the category reserved for highest-risk offenders. *See People v. Epstein*, 89 A.D.3d 570, 570, 933 N.Y.S.2d 239, 240 (1st Dep't 2011). During the Appeal, Epstein argued that his sex offender status should be downgraded to a lower level while the District Attorney's Office argued that the level-three designation was appropriate.

The District Attorney's position on appeal, however, was in stark contrast to what it argued in proceedings before the lower court, which was that Epstein "should be adjudicated a level one offender" (*i.e.*, lowest risk) in spite of the damning evidence establishing that "defendant committed multiple offenses against a series of underage girls." *Id.* at 570-71, 933 N.Y.S.2d at 240. The public has the right to know why the Manhattan District Attorney's Office switched its legal position on appeal and what justifications it advanced in its brief to explain its initial request for lenient treatment of Epstein. Similarly, the briefing submitted by Epstein, which confronted the District Attorney's arguments on appeal, may shed additional light on why the District Attorney changed course on appeal. Despite the obvious public interest in knowing this information, the briefs were filed wholly under seal pursuant to New York Civil Rights Law section 50-b – which protects the anonymity of sex abuse victims – and not a single word of either party's briefs is available to the public.

Since the District Attorney's Office has made it clear that it will not release any portion of any of the appellate briefs filed in this action without clear instructions from this Court, the Post respectfully requests an order unsealing the briefs and directing the District Attorney to provide the Post with copies redacted only to the extent necessary to preserve the anonymity of victims. As a threshold matter, the Rules of this Court and the common law both guarantee the Post's right to move this Court for an order unsealing court documents (POINT I, *supra*). And the Post easily demonstrates the "good cause" required to overcome sealing of documents under section 50-b. Simply put, the presumption of openness that governs judicial proceedings in this State is at its zenith because the documents sought by the Post are highly relevant to allegations of prosecutorial missteps and favoritism by the office of the District Attorney in a case involving a powerful sex offender (POINT II, *supra*). The Post is mindful, however, of the importance of maintaining anonymity for the victims of sexual assault and respectfully requests that this Court also direct the District Attorney's Office to redact the names of any victims before serving the Post with copies of the redacted appellate briefs. The Post further requests that this Court order the District Attorney's Office to provide the Post with copies of the redacted briefs within seven days of entry of its order granting this motion.

FACTUAL BACKGROUND

A. Epstein's Conviction for Sex Crimes and Designation as a Level Three Sex Offender

In June 2008, a Florida Court sentenced Jeffrey Epstein to eighteen months in prison after he pleaded guilty to soliciting prostitution from a fourteen-year-old girl. Affirmation of John M. Browning dated December 21, 2018 ("Browning Aff."), Ex. A.

After serving thirteen months of his sentence, Epstein was released and required to register as a sex offender in New York, where he owned property and sought to reside. *Id.* Ex. B. The New York State Board of Examiners of Sex Offenders ("NYBSO") recommended that Epstein be designated a level three sex offender – which is the level reserved for the most dangerous sexual predators – because investigators in Florida had found compelling evidence that Epstein had abused scores of underage girls, despite only pleading guilty to solicitation of a single minor. *Epstein*, 89 A.D.3d at 570, 933 N.Y.S.2d at 240.

Remarkably, New York Assistant District Attorney Jennifer Gaffney ignored the NYBSO recommendation and asked the trial court tasked with deciding Epstein's sex-offender status to designate him as a level one offender only, which is the least-restrictive category possible and is typically applied to offenders who pose the lowest risk of committing further crimes. *Id.* ADA Gaffney argued that, since "there was only an indictment for one victim," Epstein should not be placed under the heavy scrutiny required for the most dangerous class of abusers. *Id.* Ex. B. For their part, Epstein's lawyers argued that the lowest designation should be applied because "there are no real victims here." *Id.* Ex. C.

In January 2011, the judge presiding over the sex-offender registration proceedings, Justice Ruth Pickholz, rejected ADA Gaffney's arguments and designated Epstein as a level three sex offender. *Epstein*, 89 A.D.3d at 570, 933 N.Y.S.2d at 240. At a hearing preceding her ruling, Justice Pickholz told the Assistant District Attorney that she had "never seen the prosecutor's office do anything like this" and further stated that she had "done many [cases] much less troubling than this one where [prosecutors] would never make a downward argument like this." *Id.* Ex. B. When ADA Gaffney was questioned about whether she knew Epstein had sexually abused other minors, Gaffney admitted that she had never spoken to the federal investigators in Florida who had reached the conclusion that Epstein was a serial abuser of underage girls. *Id.* Ex. C.

B. The Appeal

Epstein subsequently commenced this Appeal, seeking to overturn the trial court's ruling that he is a level three sex offender. The appellate briefs submitted by Epstein and the Manhattan District Attorney were filed under seal, pursuant to New York Civil Rights Law section 50-b. *Id.* ¶ 7. That statute protects the anonymity "of any victim of a sex offense" by requiring any "court file . . . which tends to identify such a victim" to be filed under seal. N.Y. Civ. Rights Law § 50-b(1). The statute further provides, however, that court documents filed under seal shall be disclosed if a movant "demonstrates to the satisfaction of the court that good cause exists for disclosure to that person." *Id.* § 50-b(2)(b).

In a decision filed on the public docket (the "Decision"), this Court affirmed Epstein's level three offender status because the lower "court properly relied on highly reliable proof of criminal conduct for which defendant was neither indicted nor convicted." *Epstein*, 89 A.D.3d at

570, 933 N.Y.S.2d at 240. Specifically, the "evidence . . . established that [Epstein] committed multiple offenses against a series of underage girls," who "were brought to [Epstein's] home to provide 'massages' that led to very serious sex crimes." *Id.* at 570-71, 933 N.Y.S.2d at 240.

Although the Manhattan District Attorney's briefing remains under seal, the Decision indicates that "the People [took] a different position on appeal from the position they took before the hearing court." *Id.* at 571, 933 N.Y.S.2d at 241. This Court did not, however, unseal any of the appeal briefs or provide a detailed summary of the parties' respective arguments. The public and the press are thus left in the dark as to what exactly the District Attorney's Office and Epstein wrote in their respective appeal briefs. It appears that the District Attorney's Office may have taken the position that ADA Gaffney had "mistakenly conceded [before the lower court] that the conduct for which defendant was not indicted should not be considered, and that defendant should be adjudicated a level one offender." *Id.* at 572, 933 N.Y.S.2d at 241. The Decision also states that this Court rejected Epstein's argument that the District Attorney "should be estopped" from changing position on appeal and also rejected Epstein's "remaining claims" as being "improperly raised for the first time on appeal." *Id.* The public has the right to know more than these sketchy details, however, particularly when the arguments advanced by the parties on appeal clearly discuss the decision taken by the Manhattan District Attorney's Office to abruptly change its earlier position that Epstein was deserving of lenient treatment.

C. Media Interest in New York and Florida Prosecutors' Lenient Handling of Epstein's Case

The handling of Epstein's prosecution in Florida and the subsequent sex offender registration proceeding against in him New York have both been the subject of legitimate public interest and intense controversy. In the Florida proceedings, the prosecutors were criticized for allowing Epstein to enter into a seemingly favorable plea deal. For instance, as the Post reported at the time, the Florida judge sentencing Epstein "was critical of two of the deal's conditions, indicating she thought he was getting special treatment by being allowed private counselling for his sex offender treatment and to serve time in county jail instead of state prison." Samuel Goldsmith, *Jeffrey Epstein Pleads Guilty to Prostitution Charges*, N.Y. POST (June 30, 2008), *available at* https://nypost.com/2008/06/30/jeffrey-epstein-pleads-guilty-to-prostitution-charges/. Another serious concern was that Epstein's status as a billionaire investor with powerful connections – including close relationships with Bill Clinton, Donald Trump, and Prince Andrew – may have influenced prosecutors to give Epstein unduly favorable treatment and to turn a blind eye to the extent of his sexual abuse of minors. *Id.*

There has also been critical reporting on how the Manhattan District Attorney's Office handled Epstein's sex offender registration hearings in New York. After the Post obtained copies of the transcript of the status hearing before Justice Pickholz, it published an article on January 7, 2015, entitled "DA's office 'went easy' on sex offender Epstein." *Id.* Ex. B. In that article, the Post reported that "Prosecutors went to bat for the billionaire pervert at a 2011 legal hearing, asking a judge to cut the filthy-rich felon a break on the severity of his sex-offender status . . . ." *Id.* In addition to reporting the contents of the hearing transcript, Post reporters also sought to discover why the District Attorney initially sought lenient treatment for Epstein and, as part of its investigation, reached out for comment from the District Attorney's Office. As the article reported, the spokesman for the District Attorney did not give a detailed response on the record but referred the Post instead to the portion of the Decision stating "that the prosecution's position was based 'largely on the mistaken notion' that only the formal charges against Epstein could be factors in the decision." *Id.* The Post was unable to obtain copies of the briefs filed with the First Department – which would provide a more fulsome explanation of the District Attorney's position – because those documents remained under seal.

The prosecution of Epstein has remained in the news and was recently the subject of a wide-ranging investigation by the *Miami Herald*, which was published on November 28, 2018. *Id.* Ex. A. One of several in-depth feature articles published by the *Miami Herald* was entitled "Cops worked to put serial sex abuser in prison. Prosecutors worked to cut him a break." *Id.* In that article, the *Miami Herald* reported that investigators uncovered evidence that Epstein had abused "over 100 middle school and high school aged girls," but "despite ample physical evidence and multiple witnesses corroborating the girls' stories, federal prosecutors and Epstein's lawyers quietly put together a remarkable deal for Epstein." *Id.* Epstein agreed to plead guilty to soliciting an underage prostitute "in state court, and in exchange, he and his accomplices received immunity from federal sex-trafficking charges that could have sent him to prison for life. *Id.* More troubling still, Epstein's case file was sealed – including a detailed criminal complaint – so that "no one . . . could know the full scope of Epstein's crimes and who else was involved." *Id.*

The *Miami Herald*'s reporting has also had serious political ramifications. As the *Miami Herald* has reported, "[t]he U.S. attorney in Miami, Alexander Acosta, was personally involved in the negotiations" back in and around 2008. *Id.* Ex. C. Acosta subsequently became "a member of President Donald Trump's cabinet" and currently serves as the Secretary of Labor. *Id.* Since the *Miami Herald* published its expose, some members of Congress have demanded an investigation into what led to the slap-on-the-wrist punishment for Jeffrey Epstein. *See, e.g.*, Anthony Man, *Florida Democrats want investigation into Trump cabinet member's role in handling Epstein case*, SOUTH FLORIDA SUN SENTINEL (Dec. 4, 2018) *available at* https://www.sun-sentinel.com/news/politics/fl-ne-jeffrey-epstein-alex-acosta-investigation-20181204-story.html.

The Post has also persisted with its own investigation into whether the Manhattan District Attorney's Office was unduly lenient when it advocated in favor of registering Epstein as a level one sex offender. On December 1, 2018, the Post published an article entitled "Manhattan DA sided with pedophile billionaire after botching investigation." *Id.* Ex. C. Following up on its prior reporting, the Post reported Justice Pickholz's denial of ADA Gaffney's efforts to register Epstein as a level one offender and then asked the District Attorney's Office to account for the "mishandling of the Epstein hearing." *Id.* In response to questions from the Post, the District Attorney's Office insisted that ADA Gaffney simply "made a mistake." *Id.* A spokesman also claimed that Manhattan District Attorney Cyrus Vance "'was not aware' of the hearing until years later and had nothing to do with it." *Id.* But, as the Post also reported, "[s]ome law enforcement sources don't believe Vance had no clue that his office had a sex-offender case involving a Manhattan mogul with close ties to Democrats." *Id.*

Unsealing of the First Department appeal briefs in this case is crucial so that the public and the press may more fully understand why Epstein was initially offered level one offender status despite the overwhelming evidence that he was a serial sexual abuser of children.

D. The Post's Efforts to Obtain the Appellate Briefing Filed with the First Department

On December 4, 2018, Post reporter Sue Edelman contacted the Director of Communications for District Attorney Cyrus Vance, Jr. and requested a copy of the appellate brief filed by the District Attorney's Office. *Id.* ¶¶ 6-8. In making this request, Edelman specifically stated that the District Attorney's Office could redact the names of any victims of sexual abuse before forwarding the brief. *Id.* Edelman's request was denied, however, because the District Attorney's Office has taken the position that the brief was filed under seal in its entirety pursuant to N.Y. Civil Rights Law section 50-b and could not be released – even with the names of victims redacted – without an order from this Court. *Id.* Nonetheless, the District Attorney's Office stated in an email that it would "*not* oppose" the Post's motion requesting that a redacted brief be produced. *Id.* Ex. D.

Counsel for the Post also contacted counsel for Epstein to ascertain his position on the disclosure of the appellate briefs. *Id.* On December 20, 2018, Mr. Epstein's lawyer stated that he would not take a position until he had an opportunity to review the brief and reserved his right to oppose. Counsel for Epstein later informed counsel for the Post that "after consideration of your request for the unsealing of the appellate briefs with redactions of certain identities, we take no position on behalf of Mr. Epstein." *Id.* Ex. F.

On December 21, 2019, the Post moved this Court for an order unsealing the appellate briefs and directing the Manhattan District Attorney's Office to produce copies of the briefs with the names of victims redacted (the "December 21 Motion"). On January 2, 2019, counsel for the Post received an affirmation signed by Assistant District Attorney Karen Friedman Agnifilo, dated December 28, 2018, which opposed the December 21 Motion. After telling the Post that it "will *not* oppose the petition for a redacted brief," the District Attorney's Office argued that the December 21 Motion should be denied on two grounds. First, the District Attorney's office faulted the Post for supposedly failing to "furnish the requisite notice" to "the prosecuting agencies for defendant's underlying sex crimes," as required by section 50-b of the New York Civil Rights Act. *Id.* Ex. E ¶ 2. According to the Manhattan District Attorney, the Post should have notified "the federal and local prosecutor's offices in Florida, where defendant was charged" (and presumably not the Manhattan District Attorney's Office).[1]

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[1] The Post firmly disputes the District Attorney's contention – which is not supported by any authority – that section 50-b requires the Post to serve any prosecutor who touched Epstein's case in Florida in order to unseal documents

Second, Assistant District Attorney Friedman Agnifilo objected to unsealing any portion of the appellate briefs and wrote that "we cannot agree ... even to a production of the people's brief with redactions of the names or initials of Epstein's victims." *Id.* ¶ 3. She further noted, however, that "if this Court is inclined to grant the Post's motion, we would not oppose producing a copy of the People's brief, with substantial redactions necessary to protect the identities of the victims but keeping intact those portions of the brief that recount the procedural history of the SORA hearing." *Id.*

Although the Post does not agree that section 50-b requires it to notify Florida prosecutors of its intention to move this Court to unseal briefs filed by the Manhattan District Attorney in a New York sex offenders proceeding, it nonetheless voluntarily withdrew the December 21 Motion on January 4, 2019 to moot the issue and bypass an easily avoidable procedural dispute. Counsel for the Post has contacted the Palm Beach State Attorney's office and the United States Attorney's Office for the Southern District of Florida (collectively, the "Florida Prosecutors") to apprise them of its intention to refile this motion to unseal the appellate briefs with the names of victims redacted. *Id.* ¶¶ 17-18. The Post will also serve the Florida Prosecutors with copies of this motion.

Having mooted the procedural objection raised by the Manhattan District Attorney, the Post now refiles its motion respectfully requesting an order unsealing the appellate briefs and directing the District Attorney's Office to provide the Post with copies – with the names of victims redacted – within seven days of the entry of its order.

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filed by New York prosecutors in a New York court as part of proceedings to register Epstein as a sex-offender in New York State. The statute requires a movant to furnish notice to "the public officer ... with the duty of prosecuting the offense." N.Y. Civ. Rights Law §50-b. Here, the Manhattan District Attorney's Office had "the duty of prosecuting the offense" on behalf of the People of New York – *i.e.*, the sex-offender registration proceedings against Epstein in this State – and there is no question that the Post provided the Manhattan District Attorney with adequate notice of the December 21 Motion.

ARGUMENT

Despite the Manhattan District Attorney's apparent opposition to releasing any of portion of the appellate briefs, good cause exists to unseal briefs with victims' names redacted because the handling of Epstein's designation as a sex offender by New York prosecutors – including the appellate arguments regarding that designation – are of paramount public concern and should be open to public scrutiny.

I. THE POST HAS THE RIGHT TO MOVE THIS COURT FOR AN ORDER UNSEALING THE APPELLATE BRIEFING

As a threshold matter, the Practice Rules of this Court permit non-parties (like the Post) to submit "[a]pplications for sealing and unsealing documents . . . by motion." 22 NYCRR § 1250.1(e)(3). The Post's right to petition this Court for an order unsealing the appellate briefs is further buttressed by the rule that "affected members of the media should be given the opportunity to be heard" before a Court takes the drastic step of sealing court proceedings, filings or dockets. *In re Capital Newspapers Div. of Hearst Corp. v. Moynihan*, 125 A.D.2d 34, 38, 512 N.Y.S.2d 266, 269 (3d Dep't 1987), *aff'd on other grounds*, 71 N.Y.2d 263, 525 N.Y.S.2d 24 (1988). *See also Mancheski v. Gabelli Grp. Capital Partners*, 39 A.D.3d 499, 501, 835 N.Y.S.2d 595, 597 (2d Dep't 2007) ("[P]rior to issuance of an order to seal judicial documents, the court is obligated, where possible, to afford news media an opportunity to be heard.") (citing *In re Herald Co. v. Weisenberg*, 59 N.Y.2d 378, 383, 465 N.Y.S.2d 862, 864 (1983)); *Maxim, Inc. v. Feifer*, 145 A.D.3d 516, 43 N.Y.S.3d 313 (1st Dep't 2016) (reversing order denying motion of press entities to intervene for purpose of seeking access to filed motion papers and other court records).

In addition to guaranteeing the Post's right to move this Court to unseal documents, New York law also requires this Court to make "specific findings to support its determination" before limiting public access to judicial records or proceedings. *Daily News, L.P. v. Wiley*, 126 A.D.3d 511, 515, 6 N.Y.S.3d 19, 24 (1st Dep't 2015) (before sealing records, courts "must adhere strictly to the procedures set forth in the controlling case law including affording a full opportunity by any interested members of the press to be heard, and making specific findings to support its determination .... [T]rial court[s] ... cannot ... seal evidence and transcripts merely because the parties are consenting to same and the case has obtained notoriety."). Therefore, in the unlikely event that this Court declines to grant the Post's motion to unseal, either in part or *in toto*, the Post respectfully requests that this Court issue a written order setting forth the grounds for its decision.

II. GOOD CAUSE EXISTS TO UNSEAL THE APPELLATE BRIEFS

The appellate briefs should be disclosed because they are highly relevant to the public's understanding of whether the Office of the Manhattan District Attorney – whose fundamental mission is to protect the people of this State – initially showed undue deference to a dangerous pedophile, who is unusually rich and well-connected.

New York Civil Rights Law section 50-b permits courts to disclose court documents relating to the commission of a sexual offense whenever a showing is made that "good cause exists for disclosure." N.Y. Civ. Rights Law § 50-b. *See also* 22 NYCCR § 1250.1(e)(3) (permitting the "unsealing [of] court records ... upon good cause shown"). Good cause clearly exists for disclosing the appellate briefs because they contain a full explanation for why the District Attorney's Office argued before the lower court that Epstein should be registered as a level one sex offender before changing position on appeal. *See Epstein*, 89 A.D. at 571, 933 N.Y.S.2d at 241. The appellate briefs may also shed light on the extent of "the evidence ... that [Epstein] committed multiple offenses against a series of underage girls," which the District

Attorney's Office apparently disregarded or was not aware of in the proceedings before the lower court. *Id.*

Not only are the appellate briefs subject to the strong presumption of openness that applies to all judicial documents but there is also an intense public interest in disclosing these specific documents because they will shed light on why the District Attorney's Office initially took the controversial decision to argue in favor of lenient treatment of Epstein.[2] As Justice Burger wrote, "[p]eople in an open society do not demand infallibility from their institutions, but it is difficult for them to accept what they are prohibited from observing." *Richmond Newspapers, Inc. v. Virginia*, 448 U.S. 555, 572 (1980). "Only a free and unrestrained press can effectively expose deception in government. And paramount among the responsibilities of a free press is the duty to prevent any part of the government from deceiving the people . . . ." *N.Y. Times Co. v. United States*, 403 U.S. 713, 717 (1971) (Black, J. concurring). In short, the appellate briefs should be unsealed so that the Post can inform the public about the decisions taken by the District Attorney's Office with respect to Epstein so that the public can decide whether there was anything careless or improper about those decisions.

The need for transparency and public understanding of why the District Attorney's Office handled the Epstein case the way it did is heightened by the fact that District Attorney Vance has faced criticism over claims that his office gives favorable treatment to rich and powerful men accused of sexual abuse. As the *New Yorker* reported, DA Vance declined to charge Harvey Weinstein with a sex crime in 2015 even though investigators collected ample evidence that he had groped an actress without consent. *See* Jennie Suk Gersen, *Why Didn't the Manhattan DA Prosecute the Trumps or Harvey Weinstein*, NEW YORKER (Oct. 13, 2017) *available at* https://www.newyorker.com/news/news-desk/why-didnt-manhattan-da-cyrus-vance-prosecute-the-trumps-or-harvey-weinstein. Even after the emergence of the #Me Too movement and the indictment of Harvey Weinstein on rape charges, the Manhattan District Attorney's Office has continued to face criticism for failing to prosecute the Weinstein case aggressively enough. *Id.* District Attorney Vance is an elected official who wields an immense amount of discretion over prosecutions. The people of New York have the right to scrutinize how his office treated this case involving a rich and well-connected sex offender, especially in light of allegations that other notable sexual predators have benefitted from the apparent deference of prosecutors. To put it bluntly, the appellate briefs should be released immediately to avoid any impression of impropriety caused by continued secrecy.

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[2] The presumption of openness is grounded in the U.S. and New York Constitutions as well as deeply-entrenched common law rules that govern this Court. The First Amendment to the United States Constitution and article I, section 8 of the New York State Constitution both recognize the presumptive right of the public and press to access and inspect court records. *Press-Enterprise Co. v. Superior Court*, 478 U.S. 1 (1986); *Globe Newspaper Co. v. Superior Court*, 457 U.S. 596 (1982); *In re Associated Press v. Bell*, 70 N.Y.2d 32, 517 N.Y.S.2d 444 (1987). In addition to being well established under the federal and state constitutions, the right of access to court records "is also firmly grounded in common law principles." *Danco Labs., Ltd. v. Chem. Works of Gideon Richter, Ltd.*, 274 A.D.2d 1, 6, 711 N.Y.S.2d 419, 423 (1st Dep't 2000) (citing *inter alia Nixon v. Warner Commc'ns, Inc.*, 435 U.S. 589, 597 (1978)). *See also People v. Burton*, 189 A.D.2d 532, 535-36, 597 N.Y.S.2d 488, 491-92 (3d Dep't 1993) ("a common-law presumption" favors public access to court records); *In re Application of National Broad. Co.*, 635 F.2d 945, 949 (2d Cir. 1980) ("[T]he common law right to inspect and copy judicial records is beyond dispute.") (citation omitted).

There is also a strong interest in disclosing the appellate briefs to enable the public to review for itself the arguments that led this Court to issue the Decision affirming Epstein's status as a level three sex offender. By ensuring public access to the courts and enabling public discussion of the functioning of the judiciary, the news media help "the public to participate in and serve as a check upon the judicial process – an essential component in our structure of self-government." *Globe Newspaper Co.*, 457 U.S. at 606. As courts have recognized time and again, "[w]ithout access to the proceedings, the public cannot analyze and critique the reasoning of the court." *Brown & Williamson Tobacco Corp. v. FTC*, 710 F.2d 1165, 1178 (6th Cir. 1983). Thus, "[o]penness . . . enhances both the basic fairness of [a] trial and the appearance of fairness so essential to public confidence in the system." *Press-Enterprise Co. v. Superior Court*, 464 U.S. 501, 508 (1984) (citing *Richmond Newspapers*, 448 U.S. 569-71). For this reason, the appellate briefs should be unsealed so that the public has the benefit of seeing the very statements and arguments that formed the basis of this Court's Decision. It is especially important to provide a transparent view into these judicial proceedings because suspicions have already been raised about how the District Attorney's Office handled Epstein's case.

When, as here, "issues of major public importance are involved, the interests of the public as well as the press in access to court records 'weigh heavily' in favor of release." *Danco*, 274 A.D.2d at 8, 711 N.Y.S.2d at 425 (citation omitted). This constitutional presumption of open access to court records requires "the most compelling circumstances" to justify any restriction upon that right. *In re Application of Nat'l Broad. Co.*, 635 F.2d at 952. Here, it is impossible to conceive of any circumstances that might justify wholesale sealing of relevant court documents that are necessary to understand how prosecutors and this Court handled a matter of such intense public concern.

The interest of Epstein's victims to remain anonymous can be satisfied by directing the District Attorney's Office to redact the names of victims before disclosing the appellate briefs. To be clear, the Post has no interest in identifying victims of sexual assault who wish to remain anonymous. It does, however, have a right to know why the Manhattan District Attorney abruptly changed position after initially arguing that Epstein should be treated leniently. The District Attorney's Office has indicated that it "would not oppose producing a copy of the People's brief ... keeping intact those portions of the brief that recount the procedural history of the SORA hearing, the portion of the brief that is seemingly of interest to the Post." Browning Aff. Ex. E. With all due respect to the District Attorney, the Post is simply not in a position to evaluate whether the proposed redactions are reasonable. Because the Post cannot review any part of the briefs, it is impossible for the Post to know whether the information it seeks is in the procedural history section of the People's brief or in other parts of the briefing filed in the Appeal. Moreover, courts must order narrow redactions where possible to avoid overbroad sealing. *See, e.g.*, *Burton*, 189 A.D.2d at 535-36, 597 N.Y.S.2d at 491 (requiring courts to "consider less drastic alternatives to sealing the records which would adequately serve the competing interests"); *Maxim, Inc.*, 145 A.D.3d at 518, 43 N.Y.S.3d at 316 ("We recognize that it may be easier for the parties and the motion court to seal an entire court record, rather than make a determination on a document by document basis about sealing, but administrative convenience is not a compelling reason to justify sealing."). In keeping with this State's strong preference against wholesale sealing of documents, section 50-b expressly permits this Court to release judicial documents after ordering redactions "as it deems necessary . . . to preserve the confidentiality of the identity of the victim." N.Y. Civ. Rights Law § 50-b. Since the only information protected by the statute is identity of Epstein's victims, the Post respectfully requests an order directing the District Attorney to redact only the names of Epstein's victims.[3]

Since the Post does not seek the names of victims of sexual abuse and agrees that these names should be redacted before the appellate briefs are disclosed, there should be no need under the statute to provide notice "to the victim or other person legally responsible for the care of the victim." N.Y. Civ. Rights Law § 50-b(2). But to the extent such notice is necessary, the Post is unable to notify any of the victims on its own because it has no knowledge of which victims (if any) may be identified in the requested documents. If the statute requires victims to be notified even if their names will not be disclosed, the Post respectfully submits that either the Manhattan District Attorney or the Florida Prosecutors should provide notice promptly. To require the Post to notify victims itself – without any ability to discover who those victims are – would be an absurd result that defeats the purpose of the unsealing provision of section 50-b, which allows "any person" to file an application requesting that information be unsealed for "good cause."[4]

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[3] Without the benefit of reviewing the appellate briefs, the Post is not in a position to evaluate whether the briefs contain other information that might identify Epstein's victims, such as home addresses. While the Post would not object to the District Attorney's Office making good faith redactions of genuinely identifying information, these redactions should be narrowly tailored and no more expansive than is necessary to protect the victims' identities.

In sum, the strong presumption of openness that governs New York courts compels the conclusion that the appellate briefs in this action must be unsealed (with the names of any victims of a sexual offense redacted).

CONCLUSION

For the reasons set forth above, the Post respectfully requests an order unsealing the appellate briefs, which directs the District Attorney to provide counsel for the Post with copies of these documents, with the names of victims redacted, within seven days of the issuance of this Court's unsealing order.

Dated: New York, New York
January 11, 2018

Respectfully submitted,

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[4] In its affidavit filed in opposition to the December 21 Motion, the Manhattan District Attorney indicated that "to the extent that the Post is unable to furnish notice to the victims, this Office, which was not the prosecuting agency, is not in a position to do so." Browning Aff. Ex. E. The Post has mooted this objection by refiling its motion and providing the Florida Prosecutors with notice of its intent to unseal the appellate briefs with victims' redacted.

88th year, No. 24499 THURSDAY, FEBRUARY 28, 2019 $1

The Virgin Islands
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A brighter future for Lucinda Millin residents

Daily News photo by BRIAN O'CONNOR

A rainbow arches over the Lucinda Millin Home on Wednesday on St. Thomas. V.I. Housing Authority officials say they plan to demolish the existing structure and replace it with senior housing in Oswald Harris Court housing community as part of an $830-million "repositioning" of public housing throughout the territory. **Page 3**

Michael Cohen calls Trump a racist con man

Pages 2, 4

V.I.'s Plaskett at center of House hearing

Page 2

Senate to ensure art law is followed

Page 3

Perversion of Justice

As cops sought to put serial sex abuser Jeffrey Epstein in prison, prosecutors sought to cut him a break

Pages 12-14

Observers raise concerns with BVI vote

Page 5

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CONTINUED FROM PAGE 12

File photo by MIAMI HERALD

Michelle Licata, 30, is overcome with emotion while discussing her sexual encounters with Jeffrey Epstein. "He had no repercussions and doesn't even believe he did anything wrong," she said.

> **I kept looking at the timer because I didn't want to have this mental image of what he was doing.**
>
> — Michelle Licata, Jane Doe No. 2, who told police she had sexual encounters with Jeffrey Epstein

massage his chest, often instructing them to pinch his nipples, while he masturbated, according to the police report.

At times, if emboldened, he would try to penetrate them with his fingers or use a vibrator on them. He would go as far as the girls were willing to let him, including intercourse, according to police documents.

Sometimes he would instruct a young woman he described as his Yugoslavian sex slave, Nadia Marcinkova, who was over 18, to join in, the girls told Recarey. Epstein often took photographs of the girls having sex and displayed them around the house, the detective said.

Once sexually gratified, Epstein would take a shower in his massive bathroom, which the girls described as having a large shower and a hot pink and mint green sofa.

Kellen (now Vickers) and Marcinkova, through their attorneys, declined to comment for this story.

Targeting disadvantaged girls

One girl told police that she was approached by an Epstein recruiter when she was 16, and was working at the Wellington mall. Over the course of more than a year, she went to Epstein's house hundreds of times, she said.

The girl tearfully told Recarey that she often had sex with Marcinkova while Epstein watched and choreographed her moves to please himself, according to the police report. Often times, she said, she was so sore after the encounters that she could barely walk, the police report said.

But she said she was firm about not wanting to have intercourse with Epstein.

However, one day the girl said that Epstein, unable to control himself, held her down on a massage table and penetrated her, the police report said. The girl, who was 16 or 17 at the time, said that Epstein apologized and paid her $1,000, the police report said.

Most of the girls came from disadvantaged families, single-parent homes or foster care. Some had experienced troubles that belied their ages: They had parents and friends who committed suicide; mothers abused by husbands and boyfriends; fathers who molested and beat them. One girl had watched her stepfather strangle her 8-year-old stepbrother, according to court records obtained by the Herald.

Many of the girls were one step away from homelessness.

"We were stupid, poor children," said one woman, who did not want to be named because she never told anyone about Epstein. At the time, she recalled that she was 14 and a high school freshman.

"We just wanted money for school clothes, for shoes. I remember wearing shoes too tight for three years in a row. We had no family and no guidance, and we were told that we were going to just have to sit in a room topless and he was going to just look at us. It sounded so simple, and was going to be easy money for just sitting there."

The woman, who went to Epstein's home multiple times, said Epstein didn't like her because her breasts were too big. The last time she went, she said, one girl came out crying and they were instructed to leave the house and had to pay for their own cab home.

Some girls told police they were coached by their peer recruiters to lie to Epstein about their ages and say they were 18. Epstein's legal team would later claim that even if the girls were under 18, there was no way he could have known.

However, under Florida law, ignorance of a sex partner's age is not a defense for having sex with a minor.

Wild, who worked for Epstein until she was 21, said he was well aware of their tender ages — because he demanded they be young.

"He told me he wanted them as young as I could find them," she said, explaining that as she grew older and had less access to young girls, Epstein got increasingly angry with her inability to find him the young girls he desired.

"If I had a girl to bring him at breakfast, lunch and dinner, then that's how many times I would go a day. He wanted as many girls as I could get him. It was never enough."

Broadening his reach

Epstein's scheme first began to unravel in March 2005, when the parents of a 14-year-old girl told Palm Beach police that she had been molested by Epstein at his mansion. The girl reluctantly confessed that she had been brought there by two other girls, and those girls pointed to two more girls who had been there.

By the time detectives tracked down one victim, there were two and three more to find. Soon there were dozens.

"We didn't know where the victims would ever end," Reiter said.

Eventually, the girls told them about still other girls and young women they had seen at Epstein's house, many of whom didn't speak English, Recarey said.

That led Recarey to suspect that Epstein's exploits weren't just confined to Palm Beach.

Police obtained the flight logs for his private plane, and found female names and initials among the list of people who flew on the aircraft — including the names of some famous and powerful people who had also been passengers, Recarey said.

A newly released FBI report, posted on the bureau's website as a result of the Herald's Freedom of Information Act request, shows that at the time the non-prosecution deal was executed, the FBI was interviewing witnesses and victims "from across the United States." The probe stretched from Florida to New York and New Mexico, records show.

Indeed, one lawsuit, still pending in New York, alleges that Epstein used an international modeling agency to recruit girls as young as 13 from Europe, Ecuador and Brazil.

The girls lived in a New York building owned by Epstein, who paid for their visas, according to the sworn statement of Maritza Vasquez, the one-time bookkeeper for Mc2, the modeling agency.

Mike Fisten

Mike Fisten, a former Miami-Dade police sergeant who was also a homicide investigator and a member of the FBI Organized Crime Task Force, said the FBI had enough evidence to put Epstein away for a long time but was overruled by Alexander Acosta, who was Miami's top federal prosecutor at the top.

Some of the agents involved in the case were disappointed by Acosta's bowing to pressure from Epstein's lawyers, he said.

"The day that a sitting U.S. attorney is afraid of a lawyer or afraid of a defendant is a very sad day in this country," said Fisten, now a private investigator for Edwards.

Acosta's path to power

Acosta has never fully explained why he felt it was in the best interests of the underage girls — and their parents — for him to keep the agreement sealed. Or why the FBI investigation was closed even as, recently released documents show, the case was yielding more victims and evidence of a possible sex-trafficking conspiracy beyond Palm Beach.

Upon his nomination by Trump as labor secretary in 2017, Acosta was questioned about the Epstein case during a Senate confirmation hearing.

Alexander Acosta

"At the end of the day, based on the evidence, professionals within a prosecutor's office decided that a plea that guarantees someone goes to jail, that guarantees he register [as a sex offender] generally and guarantees other outcomes, is a good thing," Acosta said of his decision to not prosecute Epstein federally.

California Democratic Sen. Dianne Feinstein, in opposing Acosta for Labor secretary, noted that "his handling of a case involving sex trafficking of underage girls when he was a U.S. attorney suggests he won't put the interests of workers and everyday people ahead of the powerful and well-connected."

Marci Hamilton, a University of Pennsylvania law professor who is one of the nation's leading advocates for reforming laws involving sex crimes against children, said what Acosta and other prosecutors did is similar to what the Catholic Church did to protect pedophile priests.

"The real crime with the Catholic priests was the way they covered it up and shielded the priests," Hamilton said. "The orchestration of power by men only is protected as long as everybody agrees to keep it secret. This is a story the world needs to hear."

Jane Doe No. 2

Michelle Licata climbed a narrow, winding staircase, past walls covered with photographs of naked girls. At the top of the stairwell was a vast master bed and bath, with cream-colored shag carpeting and a hot pink and mint green sofa.

The room was dimly lit and very cold.

There was a vanity, a massage table and a timer.

A silver-haired man wearing nothing but a white towel came into the room. He lay face-down on a massage table, and while talking on a phone, directed Licata to rub his back, legs and feet.

After he hung up, the man turned over and

See **PERVERSION**, page 14

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dropped his towel, exposing himself.

He told Licata to get comfortable and then, in a firm voice, told her to take off her clothes.

At 16, Licata had never before been fully naked in front of anyone. Shaking and panicked, she mechanically pulled off her jeans and stripped down to her underwear.

He set the timer for 30 minutes and then reached over and unsnapped her bra. He then began touching her with one hand and masturbating himself with the other.

"I kept looking at the timer because I didn't want to have this mental image of what he was doing," she remembered of the massage. "He kept trying to put his fingers inside me and told me to pinch his nipples. He was mostly saying 'just do that, harder, harder and do this. … .' "

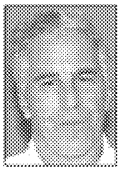
File photo by MIAMI HERALD

Michelle Licata says she was 16 when she first visited Jeffrey Epstein's home on El Brillo Way to give him a massage. She says he tried to penetrate her with his fingers.

After he was done, he stood up and walked to the shower, dismissing her as if she had been in history class.

It wasn't long before a lot of Licata's fellow students at Royal Palm Beach High School had heard about "a creepy old guy" named Jeffrey who lived in a pink waterfront mansion and was paying girls $200 to $300 to give him massages that quickly turned sexual.

Eventually, the Palm Beach police, and then the FBI, came knocking on Licata's door. In the police report, Licata was referred to as a Jane Doe 2 in order to protect her identity as a minor.



Jeffrey Epstein

There would be many more Jane Does to follow: Jane Doe No. 3, Jane Doe No. 4, Jane Does 5, 6, 7, 8 — and as the years went by — Jane Does 102 and 103.

Long before #MeToo became the catalyst for a women's movement about sexual assault — and a decade before the fall of Harvey Weinstein, Bill Cosby and U.S. Olympic gymnastics doctor Larry Nassar — there was Jeffrey Edward Epstein.

Epstein, a multimillionaire hedge fund manager whose friends included a constellation of entertainers, politicians, business titans and royalty, for years lured teenage girls to his Palm Beach mansion as part of a cult-like sex pyramid scheme, police in the town of Palm Beach found.

The girls arrived, sometimes by taxi, for trysts at all hours of the day and night.

Few were told much more than that they would be paid to give an old man a massage — and that he might ask them to strip down to their underwear or get naked. But what began as a massage often led to masturbation, oral sex, intercourse and other sex acts, police and court records show.

The alleged abuse dates back to 2001 and went on for years.

Prosecutors' special offer

In 2007, despite ample physical evidence and multiple witnesses corroborating the girls' stories, federal prosecutors and Epstein's lawyers quietly put together a remarkable deal for Epstein, then 54.

He agreed to plead guilty to two felony prostitution charges in state court, and in exchange, he and his accomplices received immunity from federal sex-trafficking charges that could have sent him to prison for life.

He served 13 months in a private wing of the Palm Beach County stockade. His alleged co-conspirators, who helped schedule his sex sessions, were never prosecuted.

The deal, called a federal non-prosecution agreement, was sealed so that no one — not even his victims — could know the full scope of Epstein's crimes and who else was involved.

The U.S. attorney in Miami, Alexander Acosta, was personally involved in the negotiations, records, letters and emails show.

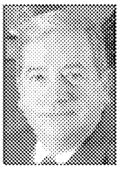
Acosta is now a member of President Donald Trump's Cabinet. As U.S. secretary of Labor, he has oversight over international child labor laws and human trafficking.

"How come people who don't have money get sent to jail — and can't even make bail — and they have to do their time and sit there and think about what they did wrong? He had no repercussions and doesn't even believe he did anything wrong," said Licata, now 30

Licata is among 36 women who were officially identified by the FBI and the U.S. Attorney's Office as victims of Epstein, now 65. But after the FBI case was closed in 2008, witnesses and alleged victims testified in civil court that there were hundreds of girls who were brought to Epstein's homes, including girls from Europe, Latin America and former Soviet Republic countries.

Kenneth Starr

But Acosta and Epstein's armada of attorneys — Harvard professor Alan Dershowitz, Jay Lefkowitz, Gerald Lefcourt, Jack Goldberger, Roy Black, Guy Lewis and former Whitewater special prosecutor Kenneth Starr — reached a consensus: Epstein would never serve time in a federal or state prison.



Michael Reiter

There were really just two people willing to risk their careers to go after Epstein: Palm Beach Police Chief Michael Reiter and Detective Joseph Recarey.

For Reiter, business tycoon Jeffrey Epstein wasn't any more formidable than any of the other 8,000 or so wealthy and powerful people living on the island. Police had handled sensational cases involving wealthy residents before — from the murders of heiresses to the rape case involving William Kennedy Smith, of the Kennedy family.

The easternmost town in Florida, Palm Beach is a 10.4-square-mile barrier island between the Intracoastal Waterway and the Atlantic Ocean populated by some of the richest people in the country.

President Trump has his "winter White House" in Palm Beach, and the town makes news as much for its glitz as it does for its unusual efforts to preserve its well-mannered image, like banning shirtless joggers.

But it was a little surprising, even to Reiter, to learn that one of its residents had a revolving door of middle school and high school girls coming to his gated compound throughout the day and night.

In their first media interviews about the case, Reiter and Recarey revealed new details about the investigation, and how they were, in their view, pressured by then-Palm Beach State Attorney Barry Krischer to downgrade the case to a misdemeanor or drop it altogether.

Between March of 2005 — when the case was opened — and seven months later, when police executed a search warrant at Epstein's home, Recarey had identified 21 possible victims, according to a copy of the unredacted police report obtained by the Herald.

By the time police felt they had enough evidence to arrest Epstein on sex charges, they had identified about 35 possible underage victims and were tracking down at least a dozen more, the police report said.

"I was surprised at how quickly it snowballed. I thought at some point there would be a last interview, but the next victim would supply me with three or four more names and the next one had three or four names and it just kept getting bigger and bigger," Recarey said.

Blaming the victims

Alan Dershowitz

By then, word had gotten back to Epstein from some of the girls that they had been questioned by police. Epstein hired famed lawyer Alan Dershowitz.

"Alan Dershowitz flew down and met privately with Krischer," Recarey said. "And the shenanigans that happened, I don't think I've ever seen or heard of before."

Police reports show that Epstein's private investigators attempted to conduct interviews while posing as cops; that they picked through Reiter's trash in search of dirt to discredit him; and that the private investigators were accused of following the girls and their families.

In one case, the father of one girl claimed he had been run off the road by a private investigator, police and court reports show.

Several of the girls said they felt intimidated and frightened by Epstein and Sarah Kellen, the millionaire's assistant and alleged scheduler of massages, who warned them not to talk to police, according to the police report.

Dershowitz, in an interview with the Herald, said he had nothing to do with gathering background on the girls — or in directing anyone to follow the police, or the girls and their families.

"I'm not an investigator. My only job was to negotiate and try the case when it comes to trial," he said.

He nevertheless convinced Krischer that the girls would not be credible on the witness stand, according to Reiter and Recarey.

The defense team's investigators compiled dossiers on the victims in an effort to show that Epstein's accusers had troubled pasts.

Dershowitz met with Krischer and Recarey, sharing with them the results of an investigation into one of the girls whom Dershowitz described as "an accomplished drama student" who hurled profanities at his investigator at "a furious pace."

"Our investigation had discovered at least one of her websites and I am enclosing some examples … the site goes on to detail, including photos, her apparent fascination with marijuana," Dershowitz wrote in an undated letter to Recarey. He also disputed the claim that one of the defense team's private investigators had misrepresented himself as a police officer.

Recarey stood his ground.

"His attorneys showed us a MySpace page where one of the girls was holding a beer in her hand, and they said, 'oh look, she is underage drinking,'" Recarey recalled. "Well, tell me what teenager doesn't? Does that mean she isn't a victim because she drank a beer? Basically, what you're telling me is the only victim of a sexual battery could be a nun."

Krischer and the lead state prosecutor on the case, Assistant State Attorney Lanna Belohlavek, began to dodge Recarey and Reiter's phone calls and emails, and they dragged their feet on approving subpoenas, Reiter and Recarey said.

"Early on, it became clear that things had changed, from Krischer saying, 'we'll put this guy away for life,' to 'these are all the reasons why we aren't going to prosecute this,'" Reiter said.

Krischer, who is now retired and in private practice, did not respond to multiple requests from the Herald for comment. Belohlavek also did not respond to an email sent to her office.

"It became apparent to me that some of our evidence was being leaked to Epstein's lawyers, who began to question everything that we had in our probable cause affidavit," Reiter said.

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INTRODUCTION

In light of concerns about mass incarceration and excessive search practices by police, [1] underenforcement of criminal law is not the first problem that springs to mind for American criminal justice. But in fact, some of the prominent contemporary complaints about U.S. criminal justice, as well as some longstanding ones, object to underenforcement of criminal law. Two of the most notable categories are failures to prosecute in cases of unjustified police violence, especially against nonwhite victims, and in cases of sexual assaults. Lower-profile examples abound as well, as do historical examples.

Given the nation's history, underenforcement problems are often related to race. Insufficient law enforcement attention to crimes in minority neighborhoods, for example, has been criticized as depriving African American victims and communities of their fair share of government protection from criminal harm. [2] In earlier eras, law enforcement inattention to, or wholesale neglect **[*845]** of, white offenders' victimization of black victims - in lynchings, attacks on civil right activists, sexual assaults, and other contexts - was often patent. [3] But the problem of unjustified underenforcement is not confined to these contexts, nor to the United States. Failures to prosecute arise from a fundamental structural challenge faced by all criminal justice systems: how to ensure unbiased, evenhanded enforcement practices - safeguards in favor of justified enforcement. This challenge gets less attention than criminal procedure's central preoccupation of guarding against excessive or groundless criminal charges. Concern about misuse of the state's prosecution authority rightly motivates much in criminal procedure, from search and seizure rules [4] and judicial review of arrests [5] to evidence disclosure duties, [6] the right to counsel, [7] and standards of proof. [8]

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[1] U.S. incarceration rates quintupled over the last forty years and are five to seven times higher than those in other advanced democracies. See *Floyd v. City of New York, 959 F. Supp. 2d 540, 572-602 (S.D.N.Y. 2013)* (documenting and holding unconstitutional widespread stop-and-frisk practices by New York City police that disproportionately targeted non-white men); Michelle Alexander, The New Jim Crow: Mass Incarceration in the Age of Colorblindness 6-9 (2010); World Prison Brief Data, Inst. for Crim. Pol'y Res. (2016), *http://www.prisonstudies.org/country/united-states-america* (comparing national data on total prison population and incarceration rates and reporting that the United States has the world's largest prison population at 2,217,947 inmates).

[2] Randall Kennedy, Race, Crime, and the Law 29 (1997).

[3] See, e.g., Equal Justice Initiative, Lynching in America: Confronting the Legacy of Racial Terror 39, 48 (3d ed. 2017) (documenting approximately 4000 lynchings in the years 1877-1950; about one percent resulted in a conviction for perpetrators).

[4] See generally Wayne R. LaFave et al., Criminal Procedure 126-63, 512-49 (5th ed. 2009) (discussing search and seizure rules).

Structural responses to the state declining to use its enforcement authority are much fewer and less prominent. At least in common law countries, enforcement decisions are the province of police and prosecutor discretion, and oversight of officials' failures to enforce has been left almost wholly to the political process. Decisions to search, arrest, or charge face modest judicial scrutiny on evidentiary grounds and - at the extreme margins - racial or **[*846]** ethnic bias. [9] Decisions not to arrest or charge are virtually immune from judicial review or other nonpolitical oversight. [10] Like other common law jurisdictions, U.S. justice systems have always rejected an approach long adopted in some civil law jurisdictions to prevent unjustified and disparate nonenforcement - a rule of mandatory prosecution that restricts executive officials' discretion over arrest and charging decisions. [11]

A broader view, however, reveals that all criminal justice systems incorporate one or more strategies to address underenforcement, which can be collectively described as redundant charging authority. All are to some degree familiar, though they are not usually described in these terms or understood as serving this common purpose.

One approach is creation of two distinct enforcement agencies with overlapping or duplicative jurisdiction. This model is a familiar safeguard against underenforcement of transnational crimes or crimes on the high seas; international criminal law routinely grants nation-states coextensive, duplicative jurisdiction to enforce international or domestic criminal laws outside their borders. International treaties on subjects such as public corruption, drug trafficking, and human trafficking [12] can be understood as agreements to create enforcement redundancy among national criminal justice agencies to solve underenforcement problems by particular states. [13] The same arrangement occurs domestically for enforcement of civil or regulatory law when administrative agencies have overlapping, and thus redundant, **[*847]** jurisdiction over the same regulated activities. [14] The most important version of this model in the United States, however, is criminal justice federalism. Due to the steady growth of federal criminal law, jurisdiction, and institutional capacity over the last century, state and federal

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[5] Gerstein v. Pugh, 420 U.S. 103, 111-16 (1975) (holding that the Fourth ***Amendment*** requires a judicial determination of probable cause prior to extended detention); County of Riverside v. McLaughlin, 500 U.S. 44, 52-58 (1991) (defining "prompt" under Gerstein's requirement of a prompt judicial determination of probable cause).

[6] Brady v. Maryland, 373 U.S. 83, 86 (1963) (holding prosecution's withholding of the confession of defendant's confederate violated defendant's due process rights).

[7] Gideon v. Wainwright, 372 U.S. 335, 342 (1963) (extending ***Sixth Amendment*** right to assistance of counsel to indigent state criminal defendants); Powell v. Alabama, 287 U.S. 45, 53 (1932) (holding defendants' rights to counsel of their choice throughout the prosecution process had been violated).

[8] In re Winship, 397 U.S. 358, 364 (1970) (holding that proof beyond a reasonable doubt is constitutionally required under the Due Process Clause).

[9] United States v. Armstrong, 517 U.S. 456, 456-71 (1996) (examining selective prosecution claim based on racial bias); see also Whren v. United States, 517 U.S. 806, 813 (1996) (holding that, in assessing the legality of police decisions to stop suspects under the Fourth ***Amendment***, courts should ignore officers' subjective motivations).

[10] See, e.g., Abby L. Dennis, Reining in the Minister of Justice: Prosecutorial Oversight and the Superseder Power, 57 Duke L.J. 131, 132-33 (2007) (describing prosecutors' "limitless, unmonitored and … unreviewable power").

[11] See infra Part II.B.

[12] See Protocol to Prevent, Suppress and Punish Trafficking in Persons, Especially Women and Children, G.A. Res. 55/25, annex II (Nov. 15, 2000), https://www.unodc.org/unodc/en/organized-crime/intro/UNTOC.html; United Nations Office on Drugs & Crime, World Drug Report 2017, U.N. Sales No. E.17.XI.7 (2017), https://www.unodc.org/wdr2017/index.html; U.S. Dep't of State, Trafficking in Persons Report 438 (2017), https://www.state.gov/documents/organization/271339.pdf.

[13] See Neil Boister, An Introduction to Transnational Criminal Law 135-95 (2d ed. 2012), http://opil.ouplaw.com/view/10.1093/law/9780199605385.001.0001/law-9780199605385-chapter-12.

[14] See Jacob E. Gersen, Overlapping and Underlapping Jurisdiction in Administrative Law, 2006 Sup. Ct. Rev. 201, 201-03 (2007).

law enforcement substantially overlap for many categories of crime. Much of this enforcement redundancy, as considered in detail below, has been a deliberate federal response to diverse problems of underenforcement in state criminal justice. The point for now, however, is the functional equivalence of duplicative federal-state jurisdiction, nation-state jurisdiction, and agency jurisdiction. All represent a common strategy to reduce underenforcement by empowering redundant enforcement authorities: independent entities with equivalent institutional capacity and expertise share jurisdiction. If one neglects to enforce, the other may. Functionally, each backstops, or provides oversight of, failures to enforce by the other.

A second model for minimizing unjustified failures to prosecute relies on private actors to create redundancy with public prosecutors' authority. Empowering private actors to file and litigate public law claims is familiar in many civil law contexts; numerous federal statutes authorize private rights of action that enable private individuals or groups to supplement public agencies' law enforcement efforts. [15] Through much of the nineteenth century, this kind of duplicative public-private enforcement authority was a familiar feature in the criminal justice systems of many states, which permitted private parties - victims - to prosecute alleged criminal wrongdoing.

Redundant charging authority takes other forms as well. In large hierarchical agencies such as the U.S. Department of Justice, internal administrative review of front-line prosecutors' charging or declination decisions by higher-ups creates a version of redundant enforcement authority; supervisors can make independent determinations and reverse front-line prosecutors. [16] **[*848]** This kind of redundancy through administrative review now exists in English, Irish, and many European criminal justice systems. [17]

More ambitiously from a U.S. perspective - because it is rare here - judicial power to review prosecutorial charging decisions is another means to create some degree of redundant charging authority between the executive and judicial branches. Although criminal charging is a core function of the executive branch, state and federal courts have modest authority to review and bar executive officials' decisions to file criminal charges. It is only as a matter of policy that courts - with a few exceptions - are not empowered to address underenforcement by reviewing the executive's noncharging decisions. (This power is somewhat broader for courts in England and Wales as well as in the law of a few states.) [18] This model of redundancy separates charging authority - for courts as for Department of Justice supervisors, the power to order prosecutors to prosecute - from enforcement authority, which includes the institutional capacity to file and litigate charges. Courts (with rare exceptions) have no administrative capacity to litigate a prosecution; but they could provide some redundancy in charging authority. [19]

In sum, charging redundancy can occur between equivalent agencies in separate governments, between public and private actors, or between agencies or branches of the same government. Criminal justice systems in Europe and the common law world have adopted or strengthened one or more of these mechanisms in recent decades. In the United States, choices among these strategies have changed over time and between jurisdictions. Nearly all states that once authorized private prosecution have long since prohibited it. Federal prosecutors are organized in a centralized hierarchical agency that makes administrative review possible, but few state prosecutors are similarly organized. For these reasons and others, the primary means of enforcement redundancy to combat underenforcement is overlapping federal- **[*849]** state authority made possible by the distinctive U.S. model of federalism.

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[15] Examples of federal statutes authorizing private rights of action include the Clayton Act, *15 U.S.C. § 15* (2006) (granting a private right of action for antitrust violations); Federal Tort Claims Act, *28 U.S.C. § 2680*(h) (1994); Title VI of the Civil Rights Act of 1964, ***42 U.S.C. § 2000e-5***(f) (1994); Americans with Disabilities Act, *42 U.S.C. § 12133* (1994). For an overview, see Pamela H. Bucy, Private Justice, *76 S. Cal. L. Rev. 1, 12-54 (2002).*

[16] See *18 U.S.C. § 3771*(f) (2012) (mandating review of federal prosecutor decisions within the Justice Department upon victim's request).

[17] See infra Part II.A.1.

[18] See infra Parts II.B.3-B.4.

[19] Note that this conception of redundant authority intersects with, but is distinct from, constitutional separation of powers. In a standard account (briefly put), separation of powers describes branches of government having distinct roles, authority, and competencies. In the main, branches do not do the same things; they do different, rival, and complementary things. But if so empowered by the legislature, courts can exercise some degree of charging authority, creating limited redundancy in charging authority between the executive and judicial branches.

This Article has several aims. One is to introduce the concept of enforcement redundancy and demonstrate its utility. Another is to highlight problems of criminal law underenforcement and to situate contemporary complaints about failures to prosecute police violence and sexual assaults as specific examples of broader enforcement deficiencies that stem from bias and favoritism in police and prosecutorial discretion. The Article also defends the observation that enforcement redundancy strategies are responses to versions of this problem. It then assesses the strengths and weaknesses of different such strategies, with primary attention on the effectiveness of the U.S. approach of redundant federal-state authority. A focus on three different categories of criminal law underenforcement - government corruption, police violence, and sexual assaults - clarifies differences in the effectiveness of the U.S. approach. Federalism has proven an effective response to states' failures to address forms of public corruption, and for those crimes, it is likely superior to its alternatives. Federal authority has had some success in compensating for states' failures to prosecute police violence and other police wrongdoing, but its efficacy is harder to judge and arguments for supplemental redundancy strategies are stronger. For sexual assaults, federal authority has failed to assert any meaningful enforcement jurisdiction to compensate for weaknesses in state justice systems. Despite the sustained efforts and notable successes of reform advocates in this area, no model of enforcement redundancy has made inroads.

The Article proceeds as follows. Part II briefly surveys evidence of and reasons for underenforcement. The need for safeguards against unjustified nonenforcement has long been recognized in the United States and elsewhere; outside the United States, as part of victims' rights reforms, it has been the object of institutional reforms. Part III elaborates the mechanisms available to address risks of criminal law underenforcement. The predominant options are (1) some authority for private actors to initiate or participate in criminal prosecutions; (2) judicial or administrative review of initial nonprosecution decisions by public prosecutors; and (3) authority for a separate, independent public prosecutor's office to bring charges when another prosecutor has declined to. Other countries - out of tradition, an absence of federalism, or as part of victims' rights reforms - rely on versions of **[*850]** the first and second options. Part III also considers why U.S. victims' rights laws, which are otherwise robust, lack either of these components adopted elsewhere, especially given that many state criminal justice systems relied on private prosecution for much of the nineteenth century. The likely answers help explain why the United States relies almost exclusively on the third option as a safeguard against underenforcement.

Finally, Part IV assesses how effectively federalism-based enforcement redundancy addresses underenforcement, particularly the recurrent, contemporary controversies around police violence and sexual assault. Redundant enforcement through overlapping federalism has had considerable success addressing some underenforcement problems, such as corruption by state and local officials, certain kinds of civil rights violations, or crimes against disfavored minority groups. [20] It is doubtful that private prosecution or judicial review could match its success. The federalism strategy has a more mixed record on the problem of unjustified police violence. Federal officials have succeeded where state officials have failed in overseeing reform of local police departments to reduce police lawbreaking, and they occasionally prosecute and convict individual officers. [21] But the vast majority of incidents of police violence go unprosecuted, including most that lead to large civil settlements for victims. [22]

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[20] See, e.g., David Grann, Killers of the Flower Moon: The Osage Murders and the Birth of the FBI 57 (2017) (describing "corrupt sheriffs and police departments" that failed to enforce the law and were unable to solve serial murders of Native American victims); Margaret Burnham, The Long Civil Rights Act and Criminal Justice, 95 B.U. L. Rev. 687, 687-88 (2015) (discussing federalism-based redundancy in the context of the Civil Rights Acts); Gregory L. Padgett, Racially-Motivated Violence and Intimidation: Inadequate State Enforcement and Federal Civil Rights Remedies, 75 J. Crim. L. & Criminology 103, 105 (1984) (advocating for federalism-based enforcement redundancy to ensure punishment in crimes against racial minorities).

[21] On federal reform of local police, see Rachel A. Harmon, Limited Leverage: Federal Remedies and Policing Reform, 32 St. Louis U. Pub. L. Rev. 33, 53-56 (2012); Rachel A. Harmon, Promoting Civil Rights Through Proactive Policing Reform, 62 Stan. L. Rev. 1, 20-51 (2009) [hereinafter Harmon, Policing Reform].

[22] Human Rights Watch, Shielded from Justice: Police Brutality and Accountability in the United States 77-84, nn.149-72 (1998), https://www.hrw.org/legacy/reports/reports98/police/index.htm (documenting "civil remedies");id. at 89-96, nn.182-200, 92-93 tbls.1-2 (documenting "low rate of federal prosecutions"); Joanna C. Schwartz, How Governments Pay: Lawsuits, Budgets, and Police Reform, 63 UCLA L. Rev. 1144, 1147-71 (2016) (documenting civil settlements for police wrongdoing in 100 localities); Ian Simpson, Prosecution of U.S. Police for Killings Surges to Highest in Decade, Reuters (Oct. 26, 2015), https://www.reuters.com/article/us-usa-police - idUSKCN0SK17L20151026 (noting twelve officers were charged for fatal shootings in the first nine months of 2015, compared to about five per year between 2005 and 2014).

It is **[*851]** unclear what portion of those incidents merit criminal prosecution. Key facts are often disputed, and while federal and state jurisdiction are coextensive here, federal criminal law generally sets a higher bar for liability than state law, especially due to its more onerous mens rea requirement. [23] That makes the former an imperfect backstop to the latter, because they are only partially redundant. And as recent changes in federal policy suggest, [24] redundancy between governments is subject to political shifts in those governments; federal oversight of state enforcement works only if federal officials are committed to the oversight role. Moreover, keeping prosecution in the exclusive province of executive officials keeps prosecutorial discretion more closely aligned with political majorities and thereby with popular sentiments about certain groups of defendants (such as police officers) and victim groups (such as criminal suspects). In this context, redundancy in state law charging by courts or private actors, rather than rival prosecutors, might make a real contribution. Finally, cases of sexual assault reveal a weakness of federalism-based redundancy. State and federal criminal jurisdiction in the United States overlap more than elsewhere, but they are not wholly coextensive. Federal prosecutors lack authority over most assaults that do not involve public officials or federal **[*852]** property. Sexual assaults are one context in which the enforcement strategies favored in Europe and England - regulated private prosecution or review of declination decisions - hold more promise.

I. UNDERENFORCEMENT AND REASONS NOT TO PROSECUTE

A. Sources of Unjustified Noncharging Decisions

Public prosecutors are the gatekeepers of criminal law enforcement, and justice systems employ a variety of safeguards against prosecutors' misjudgment, bias, incompetence, or laziness. Most are directed at prosecutors' charging decisions rather than decisions declining to charge (i.e., declination decisions), for familiar reasons - charging creates real burdens and risks for defendants. [25] Many familiar procedural components are aimed at preventing improper criminal charges or the harm they can cause. Requirements that charges are based on sufficient evidence are an obvious example, but double jeopardy laws and restrictions on prosecutors' conflicts of interest serve the same purpose. The full range of pretrial and trial procedures designed to assure accurate and unbiased adjudication are intended to sort out improper charges and attach punishments only to proper ones. [26]

Safeguards against nonenforcement, or unjustified decisions not to prosecute, are fewer, are less explicit, and (in common law jurisdictions) are less often in the form of legal rules and mandates. One explanation for this is simply that the interests at stake are not as high - no individual faces prosecution and possible punishment. Another is that many non-prosecution decisions follow from determinations that there is insufficient evidence to support charging, and common law jurisdictions **[*853]** have long left those assessments in the unregulated discretion of police and prosecutors. [27]

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[23] Police violence is often prosecuted under ***18 U.S.C. § 242*** (2012) (criminalizing the deprivation of rights under color of law). On challenges to prosecuting police violence, including federal law's intent requirement, see Barbara E. Armacost, Organizational Culture and Police Misconduct, *72 Geo. Wash. L. Rev. 453, 465-67 (2004);* Mary M. Cheh, Are Lawsuits an Answer to Police Brutality?, in Police Violence 247, 253, 258-66 (William A. Geller & Hans Toch eds., 1996); John V. Jacobi, Prosecuting Police Misconduct, *2000 Wis. L. Rev. 789, 806-11 (2000);* Paul J. Watford, Screws v. United States and the Birth of Federal Civil Rights Enforcement, *98 Marq. L. Rev. 465, 477-86 (2014);* Mark Joseph Stern, Why the Feds Can't Charge Darren Wilson: They Should, but the Supreme Court Gutted the Civil Rights Law He Violated when He Killed Michael Brown, Slate (Mar. 4, 2015), *http://www.slate.com/articles/news_and_politics/jurisprudence/2014/11/will_justice_department_charge_darren_wilson_* supreme_court_gutted_civil.html; William Yeomans, The Cognitive Dissonance of Federal Civil Rights Prosecutions and Race, ACS Blog (Feb. 13, 2015), *https://www.acslaw.org/acsblog/the-cognitive-dissonance-of-federal-civil-rights* -prosecutions-and-race.

[24] See, e.g., U.S. Attorney Gen., Memorandum: Supporting Federal, State, Local and Tribal Law Enforcement (2017); Sari Horwitz et al., Sessions Orders Justice Department to Review All Police Reform Agreements, Wash. Post (Apr. 3, 2017), *https://www.washingtonpost.com/world/national* -security/sessions-orders-justice-department-to-review-all-police-reform - agreements/2017/04/03/ba934058-18bd-11e7-9887-1a5314b56a08_story.html.

[25] See, e.g., *United States v. Armstrong, 517 U.S. 456, 463-66 (1996)* (examining the Equal Protection Clause's prohibition on racially-motivated charging); *Wayte v. United States, 470 U.S. 598, 608 (1985)* (holding due process bars prosecution in retaliation for exercising fundamental rights); *Kolender v. Lawson, 461 U.S. 352, 355 (1983)* (holding due process bars unduly vague offense definitions to reduce opportunities for selective enforcement); *Papachristou v. Jacksonville, 405 U.S. 156, 162 (1972)* (same).

[26] See *Duncan v. Louisiana, 391 U.S. 145, 156 (1968)* (regarding trial by jury as a "safeguard against the corrupt or overzealous prosecutor").

But that is not the whole story. For one, it does not follow from the fact that officials must assess evidentiary sufficiency that their assessments should be unregulated or unsupervised. The tradition in civil law jurisdictions is otherwise, and available evidence often depends on the effort and priority officials give to finding it. More importantly, how rigorously we guard against unmerited nonenforcement depends on how we value the interests harmed by nonenforcement, and on how much we worry about nonenforcement for the wrong reasons. Both have changed over time.

The primary causes of underenforcement are failing to investigate and charge due to biases against certain victims or harms, or favoritism toward certain kinds of suspects. [28] Three kinds of crimes - local government corruption, sexual assaults, and unjustified uses of force by law enforcement officers - illustrate the link between these risks, failures to enforce, and the consequences of underenforcement. Local corruption garners the least public and political attention now; [29] not coincidentally, the United States has found an effective model of enforcement redundancy on this front. [30] The justice system's responses to sexual assault and police violence, on the other hand, are subjects of heated political and policy debates. [31] There has been notable progress in reducing the criminal justice system's disregard of **[*854]** both kinds of offenses, but underenforcement - and almost as important, widespread suspicion of underenforcement - remain significant enough that they illustrate some of the key costs of those failures. Suspicion of underenforcement is itself a cost, because it reflects a loss of legitimacy for criminal justice institutions. That loss in turn undermines the system's efficacy if citizens decline to report victimization or otherwise decline to cooperate with law enforcement officials. Evidence for those effects is strong for both sexual assaults and police violence. [32] More generally, underenforcement is a form of unequal treatment that unevenly - and unjustly - distributes the important public benefits of criminal law enforcement, including the state's commitment to protect everyone equally from unlawful harms. [33] It also deprives victims of the private benefits that criminal justice is now widely recognized to afford, and owe, to victims.

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[27] See *Morrison v. Olson, 487 U.S. 654, 727-28 (1988)* (Scalia, J., dissenting) ("Law enforcement is not automatic ... . What every prosecutor is practically required to do is to select the cases for prosecution and to select those in which the offense is the most flagrant, the public harm the greatest, and the proof the most certain." (quoting Robert H. Jackson, Attorney Gen. of the U.S., Address to the Second Annual Conference of United States Attorneys: The Federal Prosecutor (Apr. 1, 1940))); 483 Parl Deb HC (5th ser.) (1951) col. 681 (UK) ("It has never been the rule ... that suspected criminal offences must automatically be the subject of prosecution.").

[28] See Alexandra Natapoff, Underenforcement, *75 Fordham L. Rev. 1715, 1722-39 (2006)* (documenting underenforcement as a significant problem). On underenforcement of sexual assault offenses, see Deborah Tuerkheimer, Underenforcement as Unequal Protection, *57 B.C. L. Rev. 1287, 1292-1303 (2016)* (discussing empirical evidence of bias leading to underenforcement).

[29] Concern about public corruption at the federal government level, by contrast, has increased, precisely where criminal and regulatory level are somewhat weaker. See, e.g., Zephyr Teachout, Corruption in America: From Benjamin Franklin's Snuff Box to Citizens United 1-16 (2014).

[30] See infra Part III.B.1.

[31] See, e.g., Do Police Use Deadly Force Too Often?, N.Y. Times: Room for Debate (Apr. 9, 2015), *https://www.nytimes.com/roomfordebate/2015/04/09/are* -police-too-quick-to-use-force.

[32] See Michael Planty et al., U.S. Dep't of Justice, Female Victims of Sexual Violence, 1994-2010, at 6 (2013), *https://www.bjs.gov/content/pub/pdf/fvsv9410.pdf* (estimating portion of sexual assaults reported to police annually varied from fifty-nine to thirty-two percent between 2003-10); Nancy Krieger et al., Police Killings and Police Deaths Are Public Health Data and Can Be Counted, PLOS Medicine 1-4 (2015), *https://journals.plos.org/plosmedicine/article/file?id=10.1371/journal.pmed.1001915&type=printable* (describing underreporting of killings by police); Kate B. Wolitzky-Taylor et al., Is Reporting of Rape on the Rise? A Comparison of Women with Reported Versus Unreported Rape Experiences in the National Women's Study Replication, 26 J. Interpersonal Violence 807, 807-08 (2011) (estimating fifteen percent of rapes were reported to police in 2006).

[33] This point is better developed in literature on policing than prosecution. See, e.g., Angela J. Davis, Arbitrary Justice: The Power of the American Prosecutor 166 (2007) (noting that prosecutorial discretion can unintentionally "produce inequitable results for similarly situated

1. Underenforcement Against Corruption

Crimes of corruption by state and local officials are a good example of harms that, at times, criminal justice systems have unduly ignored. [34] Local police and prosecutors are not institutionally well-situated to pursue and evaluate those crimes. They often have professional, if not personal, ties to other local officials, which heightens the risk of undue favoritism or judgments that are otherwise not fully disinterested. That is the main reason **[*855]** that federal investigators and prosecutors have state and local corruption in their portfolios. [35]

2. Underenforcement Against Sexual Assault

Sexual assault offenses are another context in which underenforcement is now widely recognized, but the causes are different. Rather than favoritism toward offenders, the problem seems to be bias against the type of offense, and, in varying degrees, against the victims. Failures of police to rigorously pursue allegations of sexual assaults have been widely documented. [36] Among the explanations that advocates, attorneys and some scholars point to are "the entrenched nature of long-recognized, gender-driven biases by police against domestic violence or sexual assault claims" and "against individuals from particular groups or under particular circumstances," especially against victims who are poor or are racial, ethnic or gender minorities. [37] One large-scale empirical study of why rape-kit evidence remained untested, for example, suggested that the explanation in part was "negative beliefs and stereotypes about victims, which adversely affected the quality of the investigation." [38] It bears noting that much of this bias is understood to be subtle or unconscious patterns built on cultural norms, rather than conscious, purposeful disfavor. [39] But when evidentiary records are incomplete or ambiguous, their effects are substantial.

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3. Underenforcement Against Police Excessive Uses of Force

Failures to prosecute in the wake of police shootings and other possibly excessive uses of force against civilians are scenarios that raise suspicions of both bias against victims, many of whom are black men (and often criminal suspects, another disfavored

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victims and defendants"); Natapoff, supra note 28, at 1753; David Alan Sklansky, Police and Democracy, *103 Mich. L. Rev. 1699, 1822 (2005)* (arguing that policing failures in some communities undercuts "the egalitarian project of protecting all citizens from private violence").

[34] The point extends to private actors, especially organized crime, with ties to local officials.

[35] See infra Part III.B.1. On local corruption, see generally, for example, Corruption and American Cities: Essays and Case Studies in Ethical Accountability (Joaquin Jay Gonzalez III &? Roger L. Kemp eds., 2016) (discussing the role of corruption in American cities); James L. Merriner, Grafters and Goo Goos: Corruption and Reform in Chicago, 1833-2003 (2004) (discussing the role of corruption in Chicago).

[36] See Tuerkheimer, supra note 28, at 1292-99.

[37] ACLU, Responses from the Field: Sexual Assault, Domestic Violence, and Policing 40 (2015); see also Tuerkheimer, supra note 28, at 1292-99 (citing a range of studies to conclude that "in many jurisdictions, the widespread perception that law enforcement officers will likely not pursue allegations of rape [due to race, class or gender bias] is entirely accurate").

[38] Rebecca Campbell et al., The Detroit Sexual Assault Kit (SAK) Action Research Project (ARP), Final Report 109 (2015).

[39] Davis, supra note 33, at 23-34; Tuerkheimer, supra note 28 (discussing bias in sexual assault prosecutions); cf. ACLU, supra note 37 (surveying advocates, service providers, and attorneys, who described "the entrenched nature of long-recognized, gender-driven biases by police against domestic violence or sexual assault claims" and "against individuals from particular groups or under particular circumstances," including "bias against survivors of color, and against survivors who are poor, Native American, immigrant, or LGBTQ"); Joshua Correll et al., The Police Officer's Dilemma: A Decade of Research on Racial Bias in the Decision to Shoot, 8 Soc. & Personality Psychol. Compass 201, 202-09 (2014) (finding that police training reduces some forms of racial bias compared to lay people in shooting simulations but cautioning training effects may be reduced by real-world stress and fatigue conditions); Jeffery J. Pokorak, Probing the Capital Prosecutor's Perspective: Race of the Discretionary Actors, *83 Cornell L. Rev. 1811, 1817 (1998)* (discussing unconscious bias in death penalty prosecutions).

group), and favoritism toward the class of perpetrators, law enforcement officers. [40] In the ordinary organization of criminal justice systems, those cases call on officials from one law enforcement agency to assess the evidence against officials from another, even when the agencies regularly work together. [41] As in the context of local public corruption, conflict-of-interest rules [42] are far from adequate to prevent prosecutors from making judgments in light of such professional relationships and circumstances. [43] The possibility of partiality is inevitable. When **[*857]** that possibility combines with the long history of racial disparities in U.S. criminal justice administration, widespread suspicion of non-prosecution decisions in cases of police violence against minority civilians is hardly surprising, as the Black Lives Matter movement demonstrates. [44]

4. Other Underenforcement Contexts

Corruption, sexual assaults, and police violence illustrate the key causes and effects of failures to enforce criminal law, but the same forces are recognizably at work in other social contexts. Scholars and advocates have pointed to biases as explanations for inadequate law enforcement responses to offenses against undocumented aliens, sex workers, institutionalized persons, and targets of anti-LGBT hate crimes. [45] Complaints that police ignored wrongdoing against racial-minority victims in minority communities were prominent in the 1970s and 1980s. [46] Some of **[*858]** the remedies, however - which included harsher drug laws adopted with substantial support from African American politicians and communities - have proven deeply problematic for those same communities. [47]

Finally, less pernicious biases and favoritism are suspected explanations for lenient enforcement patterns in lower-visibility contexts, such as bicyclists killed by motor vehicle drivers, [48] employees injured on the job due to workplace safety violations, and bystanders shot by recreational hunters. [49] Even critics of those enforcement decisions in those settings view them as products of subtle or unconscious empathy with vehicle drivers, employers, and recreational gun users, which incline officials to assess conduct as non-negligent rather than reckless. [50] Yet even those relatively benign affinities can lead to sub-optimal enforcement policies that might benefit from redundant evaluation of charging decisions.

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[40] Prison guard assaults on inmates raise the same concerns, although they get less public attention. For a notorious failure to prosecute prison guards and law enforcement officials for unjustified lethal force, see generally Heather Ann Thompson, Blood in the Water: The Attica Prison Uprising of 1971 and Its Legacy (2016).

[41] Cf. Paul Cassell, Who Prosecutes the Police? Perceptions of Bias in Police Misconduct Investigations and a Possible Remedy, Wash. Post: Vololkh Conspiracy Blog (Dec. 5, 2014), *https://www.washingtonpost.com/news/volokh* -conspiracy/wp/2014/12/05/who-prosecutes-the-police-perceptions-of-bias-in-police-misconduct-investigations-and-a-possible-remedy (describing the problem of local prosecutors' handling police cases as a "perception of bias" rather than a "conflict of interest" and recommending state attorneys general handle police cases). One solution, followed in Wisconsin, is to assign investigation of deaths involving law enforcement officers to a state-level investigative agency unconnected to the local agency of the officer under investigation.*Wis. Stat.§§175.47*, *950.04(1v)(do)*, *950.08(2g)(h)* (2014).

[42] E.g., Criminal Justice Standards 3-1.3 (A.B.A. 2015); cf. *Braman v. Corbett, 19 A.3d 1151, 1154 (Pa. Super. Ct. 2011)* (describing a situation where a district attorney's office recused itself from decision to prosecute on a private complaint alleging the district attorney committed rape, and the state attorney general investigated and made the decision not to prosecute).

[43] For a disturbing account of prosecutorial deference to police, see Nicole Gonzalez Van Cleve, Crook County: Racism and Injustice in America's Largest Criminal Court 127-56 (2016); David A. Harris, The Interaction and Relationship Between Prosecutors and Police Officers in the United States, and How This Affects Police Reform Efforts, in The Prosecutor in Transnational Perspective 54, 55, 60-63 (Erik Luna & Marianne Wade eds., 2012) (describing reasons why the prospect of police reform through the efforts of state prosecutors is "bleak"); Nicole Gonzalez Van Cleve, Chicago's Racist Cops and Racist Courts, N.Y. Times (Apr. 14, 2016), *https://www.nytimes.com/2016/04/15/opinion/chicagos-racist-cops-and-racist-courts.html*; see also Kate Levine, The Ultimate Conflict, Slate (Sept. 11, 2014),*http://www.slate.com/articles/news_* and_politics/jurisprudence/2014/09/local_prosecutor_bob_mcculloch_should_not_be_the_one_to_decide_whether_to.html. For a harrowing account of a federal prosecutor who did not show deference to fellow law enforcement officials and faced apparent retaliation for it, see Paul Butler, Let's Get Free: A Hip-Hop Theory of Justice 1-21 (2009).

B. Other Contributions to Underenforcement

It is worth noting that prosecutors themselves might not share those biases so much as take account of them in a local community and jury pool. Expecting juries will be unreceptive to a case is one reason that some prosecutors cite for not charging in some cases. There is evidence for this with regard to hate **[*859]** crimes against LGBT victim groups, for example, [51] and the difficulty prosecutors have faced in convicting police officer defendants is a well-recognized hurdle in police violence cases. [52] The same considerations can cut against prosecutions when victims are undocumented immigrants, sex workers, prisoners, and suspects in custody. [53] Redundant enforcement authority can do less to redress this barrier, although depending on its form, it is not powerless. A separate prosecuting authority might bring better investigation and fact development, or different jurisdictional rules that change the composition of jury venires. [54]

Inadequate funding for criminal justice agencies can also play a role in aggravating areas of unjustified underenforcement. Lack of public resources is an accepted (and inevitable) justification for declining to prosecute in some cases where evidence is sufficient to prove guilt. [55] But funding constraints are **[*860]** not an affirmative good on par with other policy-based, public-interest justifications for non-prosecution, such as judgments finding that civil, regulatory, or public-health remedies are preferable to criminal sanctions, or concluding that third-party harms outweigh prosecution's benefits. [56] Resource constraints are a problem justice systems would like to minimize. Two of the three primary forms of enforcement redundancy do exactly that, or have in the past. Expanding federal law enforcement jurisdiction over crimes already within state jurisdiction was designed to bring federal resources to bear on crimes where state resources were insufficient. [57] And private prosecution, where it **[*861]** still exists, has an equivalent effect - it permits victims to contribute private funds to public enforcement efforts. It is no coincidence that common law jurisdictions relied on private prosecution most heavily - through the mid-nineteenth century - when state capacity, including criminal justice infrastructure, was much thinner. [58]

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[44] See, e.g., Paul D. Butler, Poor People Lose: Gideon and the Critique of Rights, *122 Yale L.J. 2176, 2204 (2013)* (describing protest movements and other responses to racially disparate criminal justice policies); Roseanna Sommers, Will Putting Cameras on Police Reduce Polarization?, *125 Yale L.J. 1304, 1307-17 (2016)* (describing polarized public perceptions of, and protests against, police uses of force and non-prosecution of police); What We Believe, Black Lives Matter, *https://blacklivesmatter.com/about/what-we-believe* (last visited Oct. 30, 2018).

[45] See Avlana Eisenberg, Expressive Enforcement, *61 UCLA L. Rev. 858, 861-64 (2014)* (studying the reasons prosecutors choose not to charge hate crimes); Natapoff, supra note 28 (summarizing evidence of underenforcement of crimes against prostitutes, undocumented immigrants, residents of certain low-income neighborhoods, and drug-crime suspects); see also Human Rights Watch, supra note 22, at 102 ("In fiscal year 1997, the [DOJ] Civil Rights Division received a total of 10,891 complaints [against law enforcement officers], ... leading to twenty-five indictments and informations, involving sixty-seven law enforcement agents; nine were convicted, nineteen entered guilty pleas, and four were acquitted."); Ryan Gabrielson et al., Deadly Force, in Black and White, ProPublica (Oct. 10, 2014), *https://www.propublica.org/article/deadly-force-in-black-and-white* ("Analysis of killings by police shows outsize risk for young black males.").

[46] See Kennedy, supra note 2, at 29-75 (providing a broader account of complaints about law enforcement providing insufficient protection to black communities); Rod K. Brunson & Ronald Weitzer, Police Relations with Black and White Youths in Different Urban Neighborhoods, 44 Urb. Aff. Rev. 858, 876 (2009) ("Perceived police under-protection or poor service in poor, minority neighborhoods has been complained about for generations ... .").

[47] Michael Javen Fortner, Black Silent Majority: The Rockefeller Drug Laws and the Politics of Punishment 173-216 (2015) (describing support from working-class and middle-class blacks for punitive drugs laws in the 1970s as a means to fight growing disorder in black communities); Kennedy, supra note 2, at 351-86; David A. Sklansky, Cocaine, Race, and Equal Protection, *47 Stan. L. Rev. 1283, 1285-90 (1995)* (describing the effects of anti-cocaine laws on black communities). Underenforcement of criminal law by southern states through the 1960s, when civil rights activists were the victims, are another example.

When resource constraints remain, however, they force officials to choose which cases get priority. That creates more opportunity for biases and favoritism to play a role in determining which cases to charge and which to forgo. That is especially so with crimes in which evidence development is more costly, so officials have to decide whether to invest scarce resources in those that require substantial investigative efforts. Both sexual assault and police violence cases often require larger-scale investments to develop evidence sufficient for prosecution. Failures to make those investments are common reasons for non-prosecution in both contexts. [59]

II. MECHANISMS OF PROSECUTORIAL ACCOUNTABILITY

For a range of reasons and across a range of contexts, public prosecutors' failures to enforce criminal law have been of sufficient concern to lead contemporary justice systems to devise checks against unjustified underenforcement. Approaches take three basic forms: (1) limited authority for private parties to initiate or participate in criminal prosecutions; (2) independent review of initial non-prosecution decisions, upon petition from a **[*862]** victim; and (3) multiple, independent public prosecution agencies with independent authority to bring charges for the same wrongdoing. Outside the United States, the first two options predominate; their expansion in recent years is a direct consequence of broader reforms to expand crime victims' rights. [60] U.S. jurisdictions, however, rely almost wholly on the third model. Despite having adopted otherwise expansive victims' rights laws in recent decades in response to an influential movement for crime victims' rights, state and federal laws consistently and explicitly avoid granting any formal authority to private parties, or courts, over criminal charging. The next three Sections provide an overview of these options, where they exist. Largely with regard to U.S. policy choices only, they also suggest reasons that one model prevailed over others.

A. Victim Rights and Private Versus Public Interests

In the wake of victims' rights movements in North America and Europe, crime victims now have an array of legal rights once criminal charges are filed. Victims in the U.S. and European jurisdictions now commonly have rights to participate that include rights to consult with prosecutors, to be notified of and present at court proceedings, and to offer statements at stages such as hearings on bail, sentencing, and parole. [61]

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[48] See Daniel Duane, Is It O.K. to Kill Cyclists?, N.Y. Times (Nov. 9, 2013), *https://www.nytimes.com/2013/11/10/opinion/sunday/is-it-ok-to-kill-cyclists* .html (discussing failures to prosecute motor vehicle drivers who injure or kill bicyclists); see also BikeMaps.org, *https://bikemaps.org* (last visited Oct. 30, 2018) (displaying a crowd-sourced map of locations of cyclist injuries and fatalities).

[49] See John F. Decker, Don't Forget to Wear Your Hunter Orange (or Flack Jacket): A Critique on the Lack of Prosecution of Hunting "Accidents," *56 S.C. L. Rev. 135, 166-73 (2004).*

[50] See id.; Duane, supra note 48.

[51] Eisenberg, supra note 45, at 893-96 (discussing data from prosecutor interviews). In the contexts Eisenberg describes, prosecutors typically forgo hate-crime offenses in favor of other charges rather than declining to prosecute altogether. Though the focus here is on prosecutors, they may not be the key cause of underenforcement. For similar reasons, police may not investigate or arrest in such cases, or if they do prosecution can be undermined by lax evidence-gathering. Police practices are the focus on much of the scholarship on underenforcement of certain offenses. Much of the literature on inadequate enforcement of sexual assault crimes focuses on weaknesses in the police rather than prosecutors. See, e.g., Tuerkheimer, supra note 28, at 1292-99 (discussing evidence of police bias).

[52] See, e.g., Alan Blinder, Michael Slager, Officer in Walter Scott Shooting, Gets 20-Year Sentence, N.Y. Times (Dec. 7, 2017), *https://www.nytimes.com/2017/12/07/us/michael-slager-sentence-walter-scott.html* (explaining that an officer pled guilty in federal court after a 2016 prosecution in state court ended with a hung jury).

[53] See Natapoff, supra note 28.

[54] See, e.g., id.

[55] See U.S. Dep't of Justice, United States Attorneys' Manual § 9-27.230 cmt. 1 (1997) (recognizing limited prosecution resources); see also Human Rights Watch, supra note 22, at 99 (listing "lack of investigative or prosecutorial resources" among the most common reasons noted by the federal Civil Rights Division for declining to prosecute); U.S. Dep't of Justice, FY 2013 Performance Budget: Civil Rights Division 39 (noting that strengthening of civil rights enforcement efforts under the "Vulnerable People Priority" policy "has been reversed because full

Under the criminal justice systems of all other major common law countries and nearly all European states, victims' rights also include authority to challenge prosecutors' decisions not to prosecute, either by a limited right to initiate prosecutions as private parties or by enabling victims to trigger judicial or **[*863]** administrative review of noncharging decisions.[62] By contrast, nearly every U.S. jurisdiction rejects these mechanisms. State and federal laws consistently avoid permitting victims any power to challenge or encroach on public prosecutorial authority. Federal law, for example, explicitly dictates that "nothing in this [victims' rights] chapter shall be construed to impair the prosecutorial discretion of the Attorney General or any officer under his direction."[63] State statutes manifest the same policy in various ways, such as by prohibiting legal remedies for violations of participation rights they create.[64] U.S. laws limit victims' participation to "non-dispositive" forms, such as providing information and personal statements to prosecutors, judges, and parole boards, which facilitates victims' influence on public officials' decisionmaking.[65] But state and federal policy rejects enlisting victims as "agents of accountability" for public prosecution.[66]

In U.S. jurisdictions and elsewhere, the conceptual innovation of victims' rights laws was to recognize victims' distinct private **[*864]** interests in public criminal litigation. Most rights are specific entitlements to advance victims' broader, dignitary right to be "treated with fairness and with respect for the victim's dignity."[67] These provisions conceive of victims as "agents of individual rights" and "independent from systemic interests," and their interests can either conflict or align with those of law enforcement.[68] At the same time, victim participation rights can also be understood to serve a broader public interest in procedural outcomes, on the premise, for example, that prosecutors' and judges' decisions will improve with direct input from victims. Public decisionmaking risks substantive deficiency, and criminal process would be procedurally deficient, without due regard for victims' interests. Jurisdictions that empower victims to challenge non-prosecution decisions enable private parties themselves to address the problem of criminal law underenforcement. The remainder of this Section provides some detail on contemporary forms of private prosecution authority, their capacity to advance public as well as private interests, and reasons for its absence (or demise) in U.S. jurisdictions.

1. Private Prosecution in the Shadow of Public Prosecution

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funding of these program areas was not provided"). In specific contexts as diverse as tax law and marijuana control, legislators intentionally limit enforcement budgets in order to restrict enforcement efforts. See Daniel C. Richman, Federal Criminal Law, Congressional Delegation, and Enforcement Discretion, *46 UCLA L. Rev. 757, 793-99 (1999)* (discussing agency budget appropriations as a mechanism of congressional control over some agencies, such as the IRS, more than others, such as the FBI); Rachael Bade, Republicans Seek to Cripple IRS: The GOP's Moves Will Gut the Tax Agency, Advocates Warn, Politico (Dec. 11, 2014), *https://www.politico.com/story/2014/12/republicans-irs-regulations-113484* (quoting a senator's aim to use "the power of the purse" to "push back on the regulatory overreach" of the IRS and EPA); Douglas A. Berman, Mixed Outcomes for Marijuana Reform Efforts in Latest Omnibus Spending Bill from Congress, Sent'g L. & Pol'y Blog (Dec. 16, 2015),*http://sentencing.typepad.com/sentencing_law_and_policy/2015/week51/index.html* (describing H.R. 4660, enacted as part of a spending bill, which prohibited spending of Justice Department funding to hinder state medical marijuana policies).

[56] See, e.g., Crown Prosecution Serv., The Code for Crown Prosecutors 4 (2013), *https://www.cps.gov.uk/sites/default/files/documents/publications/code_2013_accessible_english.pdf* (providing guidelines for England and Wales). Familiar policies include declinations based on first-offender or drug-court diversion programs, the adequacy of civil penalties, a policy preference for public health responses to drug abuse, and - with regard to marijuana - federal deference to state policymaking. See Memorandum from James M. Cole, Deputy Attorney Gen. to U.S. Attorneys, Guidance Regarding Marijuana Enforcement (Aug. 29, 2013),http://www.justice. gov/iso/opa/resources/3052013829132756857467.pdf (describing Justice Department policy not to prosecute marijuana dealers who comply with state law). For local examples, see Joseph Goldstein, Spare a Swipe? New York City Eases Rules for a Subway Request, N.Y. Times (Apr. 17, 2016), *https://www.nytimes.com/2016/04/18/nyregion/spare-a-swipe-new-york-city-eases-rules-for-a-subway-request.html* (describing a new policy "by the Manhattan district attorney's office to no longer prosecute people arrested for minor infractions such as swipe-begging, smoking in the subway, or taking up two seats on a subway car"); Greg LaRose, No Arrests for Pot Possession in New Orleans, Council Decides, Nola.com (Mar. 17, 2016), *https://www.nola.com/politics/index.ssf/2016/03/marijuana_possession_* city_coun.html (reporting city council vote to expand range of marijuana offenses for which police do not have to arrest offenders or charge as state criminal misdemeanors); Max Taves & Justin Scheck, San Francisco Police Ease Drug Enforcement, Wall St. J. (Aug. 1, 2012), *https://www.wsj.com/articles/SB10000872396390444226904577559243414878630* (describing police treating drug possession crimes as a low priority in part because the chief prosecutor "looks at drug possession as a health issue"). Seattle city voters in 2003 approved Initiative 75, which established adult personal marijuana use as "Seattle's lowest law enforcement priority." Seattle Voters Approve Initiative Making Marijuana Enforcement City's "Lowest Priority," NORML (Sept. 18, 2003),*http://norml.org/news/2003/09/18/seattle-voters-approve-initiative-making* -marijuana-enforcement-city-s-lowest-priority.

Public prosecutors now dominate enforcement decisions in both common law-based and civil law-based justice systems worldwide. That is hardly surprising, given the far-reaching regulatory scope of modern criminal law and high expectations that the state will ensure security against social disorder and innumerable harms, and will intervene in risk creation long before manifest criminal conduct or injury. [69] That agenda requires capacity, resources, and expertise that only public agencies can marshal. Moreover, a criminal enforcement regime that relied heavily on private plaintiffs would be one skewed against redress for poor victims who cannot bear litigation costs to vindicate their own interests. [70] Without safeguards, such a regime **[*865]** also could be at the mercy of the varied, perhaps idiosyncratic motives and interests of private actors lodging criminal complaints.

Still, many countries continue to authorize private citizens to initiate criminal prosecutions when public officials do not, and others allow privately funded attorneys to assist or supplement public prosecutors in litigating criminal cases. Canada, Australia, New Zealand, and England and Wales all continue to allow private prosecutions, [71] and fifteen of the twenty-eight member states of the European Union grant victims some comparable **[*866]** authority. [72] Details vary across jurisdictions, but everywhere private prosecutors' authority is limited by oversight from public **[*867]** prosecutors and courts. [73] The standard common law model is that public prosecutors retain the power to take over privately filed charges and then either try the case themselves, negotiate a plea bargain, or - more commonly when intervention occurs - dismiss the charges altogether. In this framework, private actors can press charges when public officials do not, but functionally they serve primarily as a mechanism for political accountability. Through private charging in the wake of public prosecutors' declination, victims force public officials to justify publicly their reasons for not charging and for vetoing privately filed charges - and to do so on grounds other than public resource constraints, given that a private actor has offered to bear the costs. Given the private cost barriers and the capacity of public prosecution agencies, it is unsurprising that, even where permitted, privately initiated charges nonetheless contribute to a tiny fraction of prosecutions on criminal dockets. [74]

2. Abolition of Private Prosecution in State Criminal Justice

U.S. jurisdictions are comparative exceptions; nearly all long ago prohibited privately initiated prosecutions, [75] even though in other contexts private actors continue to enforce public law in service of public interests. [76] But private criminal charges were

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[57] See Harmon, Policing Reform, supra note 21, at 20-51. Federal funding to state and local enforcement agencies is a more direct example of supplementing resources. Federal influence over local enforcement policies that comes with such funding is an attenuated version of enforcement redundancy. Id. at 66.

[58] On staffing of state prosecutor offices in the nineteenth century, see Nicholas R. Parrillo, Against the Profit Motive: The Salary Revolution in American Government, 1780-1940, at 11-23 (2013).

[59] On sexual assault cases (especially reasons for not testing evidence gathered in rape kits), see Campbell et al., supra note 38, at 60-100; Tuerkheimer, supra note 28, at 1297. On police use-of-force cases, see Human Rights Watch, supra note 22, at 99 (reporting that the Justice Department Civil Rights Division's "most common reasons for declining prosecution were: weak or insufficient admissible evidence ... ; lack of evidence of criminal intent; ... and lack of investigative or prosecutorial resources"). For a good analysis of how police shootings of "unarmed victims" vary widely in critical factual details and why many are justified, see Heather Mac Donald, Black and Unarmed: Behind the Numbers: What the Black Lives Matter Movement Misses About Those Police Shootings, Marshall Project (Feb. 8, 2016), https://www .themarshallproject.org/2016/02/08/black-and-unarmed-behind-the-numbers.

[60] See, e.g., Council Directive 2012/29, 2012 O.J. (L 315) 57 (EC), http://eur -lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32012L0029 (defining standards for treatment and rights of crime victims in E.U. member states); Marie Manikis, Conceptualizing the Victim Within Criminal Justice Processes in Common Law Tradition, in Oxford Handbook on Criminal Process (Darryl K. Brown et al. eds., forthcoming 2019) (manuscript at 18-19) (on file with author).

[61] For an overview of victim rights in Europe, see Slawomir R. Buczma, An Overview of the Law Concerning Protection of Victims of Crime in the View of the Adoption of the Directive 2012/29/EU Establishing Minimum Standards on the Rights, Support and Protection of Victims of Crime in the European Union, 14 ERA F. 235, 239-41 (2013). On U.S. jurisdictions, see Crime Victim Rights Act (***CVRA***), *18 U.S.C. § 3771*(a) (2012) (enumerating the federal rights of victims of crime); Michael Solimine & Kathryn Elvey, Federalism, Federal Courts, and Victims' Rights, *64 Cath. U. L. Rev. 909, 913-14 & nn.30-31 (2015)* (collecting all thirty-two state constitutional provisions and all fifty state statutes relating to victims' rights).

[62] See infra Part II.B.

once common and significant in many state justice systems. U.S. colonies and states created public prosecution offices much earlier than England. [77]

[*868] Even so, in the nation's earliest decades, those officials were often part-time or short-term officials, whose duties were often primarily quasi-judicial or administrative. [78] For those reasons, in many states those officials coexisted alongside private prosecutors with whom they shared some similarities. Early public prosecutors were paid by the case or the conviction [79] and pursued cases from private complainants. [80] But by the mid-nineteenth century, every state had public prosecutor offices of some sort. [81] Increasingly, they were full-time and accompanied by **[*869]** public police forces. In this context, private prosecutions diminished, then vanished. [82]

However, because public prosecutors continued to suffer from poor funding (and consequently were held in low regard), [83] some states continued an alternate form of private prosecution: privately funded attorneys could assist in criminal prosecutions as long as the public prosecutor supervised or retained formal control. [84] This form of ancillary or supplementary private prosecution, which leaves charging decisions in public hands, is still permitted in several states. [85] Otherwise, only vestiges of private **[*870]** prosecution remain in a few states. Pennsylvania seems to have the strongest version: it permits private prosecutions for any offense upon the approval from a state prosecutor or a judge. [86] Rhode Island authorizes private prosecutions only for misdemeanors. [87] Under state common law, New Hampshire might permit the same for nonjailable offenses. [88] Beyond that, judges in many states can issue an arrest warrant or criminal summons based on a private person's testimony, but public prosecutors control whether to go forward with the case. [89]

[*871] In sum, U.S. jurisdictions are unusual among common law jurisdictions in having abolished private prosecution as a means to vindicate victims' private interests, a supplement to public enforcement resources, and a structural check on selective underenforcement from biases in public prosecutors' discretionary decisions not to charge. English authorities, in contrast, explicitly recognize this public function for private prosecution. Private actors' authority to second-guess declination decisions - charging decision redundancy - operates as "the ultimate safeguard for the citizen against inaction on the part of the authorities." [90] The only remnant of this view in the United States seems to be in Pennsylvania. Its courts view victim-initiated

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[63] *18 U.S.C. § 3771*(d)(6). Elsewhere, regarding victim complaints of rights violations to the Justice Department, the statute provides that "the Attorney General ... shall be the final arbiter of the complaint, and that there shall be no judicial review of the final decision of the Attorney General by a complainant." Id. § 3771(f)(2)(D); see also *United States v. Thetford, 935 F. Supp. 2d 1280, 1282 (N.D. Ala. 2013)* ("These rights, however, do not extend to giving crime victims veto power over the prosecutor's discretion."); *Does v. United States, 817 F. Supp. 2d 1337, 1343 (S.D. Fla. 2011)* ("To the extent that the victims' pre-charge ***CVRA*** rights impinge upon prosecutorial discretion, under the plain language of the statute those rights must yield.").

[64] See, e.g., *Ohio Rev. Code Ann. § 2930.06(A)* (West 2004) ("A prosecutor's failure to confer with a victim ... does not affect the validity" of a decision to dismiss charges, plea agreement, or other disposition). Only a few jurisdictions, such as California and the federal system, provide for meaningful enforcement of participation rights by, for example, allowing victims to intervene in trial proceedings to demand rights, or to appeal trial court violations; to facilitate a remedy, courts may order that a guilty plea or sentence be re-opened. See Cal. Const. art. I, § 28(c)(1) (stating that a victim may enforce a list of enumerated rights in trial or appellate court "as a matter of right"); *18 U.S.C. § 3771*(d); cf. *Paroline v. United States, 134 S. Ct. 1710, 1718 (2014)* (providing an example of a decision resulting from a victim's appeal of a restitution order).

[65] See Ian Edwards, An Ambiguous Participant: The Crime Victim and Criminal Justice Decision-Making, 44 Brit. J. Criminology 967, 974 (2004) (classifying "dispositive" and "non-dispositive" forms of victim participation and putting modes of consultation, information-provision, and expression under the latter heading).

[66] See Marie Manikis, Expanding Participation: Victims as Agents of Accountability in the Criminal Justice Process, Pub. L. 63, 69 n.29 (2017).

[67] See, e.g., Ohio Const. art. I, § 10(a) (establishing victims' rights to "fairness, dignity, and respect"); Tex. Const. art. I, § 30(a)(1) (establishing victims' "right to be treated with fairness and with respect for the victim's dignity and privacy"); *18 U.S.C. § 3771*(a)(8) (establishing victims' "right to be treated with fairness and with respect for the victim's dignity").

[68] Manikis, supra note 60.

prosecutions as fulfilling the same structural purpose. Allowing private actors to begin prosecutions meets "the need for a system of checks and balances on the office of the district attorney" and "constitutes a recognition by the legislature that the office of the district attorney should be subject to a system of checks and balances." [91]

The rarity of private charges in jurisdictions that authorize them hardly justifies their abolition. Private prosecutions should be rare in well-functioning public prosecution systems, because public agencies pursue most provable cases and because private actors must bear considerable costs to press charges themselves. Moreover, other rules and institutions - including other safeguards on prosecutorial charging - endure despite few indications of their utility. There has never been a successful claim that a criminal charge violated the Equal Protection prohibition on racially biased charging, [92] but few argue the doctrine lacks at least normative value. [93] Grand juries rarely reject prosecutors' **[*872]** charging requests for indictments, but courts continue to tout them as a structural check on prosecutors. [94] Like private prosecution, these safeguards may work by deterring biased or ill-conceived prosecutorial decisions; their efficacy is probably impossible to measure.

A contributing explanation for the U.S. aversion to private prosecution may lie in a familiar theme of U.S. law and history: race. During the first several decades of the nineteenth century, when private citizens could prosecute crimes, many states - and not only Southern ones - either denied African Americans legal capacity as litigants [95] or barred them from testifying under oath on the basis of race. Among other effects, those barriers barred private prosecutions by African Americans. [96] After 1865 - an era in which rights to litigate and testify were viewed by many as more meaningful than the right to vote [97] - those race-based legal disabilities were abolished. [98] In the same period, private charging authority, already on the decline, was abolished in most **[*873]** states that still permitted it. States that retained a formal litigation role for crime victims did so by allowing privately funded attorneys to assist in prosecutions filed and controlled by public prosecutors, thus ensuring that public officials are the exclusive gatekeepers of criminal law enforcement. Between the 1840s and 1860s, prosecutors had become locally elected officials in nearly all states. That effectively aligned their charging monopoly with the preferences of local white majorities (or white minorities in localities in which black citizens were the majority, once Southern whites succeeded in disenfranchising black citizens). [99] Evidence for the relationship between race and the demise of private prosecution is

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[69] Among myriad examples are crimes of preparation, conspiracy, possession of contraband, consensual exchanges (e.g., of drugs or sex for money), and many kinds of criminal attempts. See Andrew Ashworth & Lucia Zedner, Preventive Justice 95-118, 171-223 (2014).

[70] Douglas Campbell, 2 The Puritan in Holland, England, and America 444 (1892) (criticizing the English system of private prosecution as one "by the rich for the rich"); Joan E. Jacoby, The American Prosecutor: A Search for Identity 17 (1980). German victims who challenge a non-prosecution decision must put up security to cover the public costs of judicial review. See Strafprozessordnung [StPO] [Code of Criminal Procedure], § 176, translation at *https://www.gesetze-im-internet.de/englisch_stpo/englisch_stpo* .html; Ante Novokmet, The Right of a Victim to a Review of a Decision Not to Prosecute as Set out in Article 11 of Directive 2012/29/EU and an Assessment of Its Transposition in Germany, Italy, France and Croatia, 12 Utrecht L. Rev. 86, 94 (2016).

[71] For England and Wales, see Prosecution of Offences Act 1985, c. 23, § 6, *https://www.legislation.gov.uk/ukpga/1985/23* (stating that the creation of Crown Prosecution Service shall not "preclude any person from instituting any criminal proceedings or conducting any criminal proceedings"). For Canada, see, for example, Ontario Provincial Offences Act, R.S.O. 1990, c. P.33; Director of Public Prosecutions Act, S.C. 2006, c 9, § 121, para. 3(3)(f) (describing DPP "duties and functions," which includes "exercising the authority of the Attorney General respecting private prosecutions, including to intervene and assume the conduct of - or direct the stay of - such prosecutions"); Private Prosecutions, Ministry Att'y Gen., *https://www.attorneygeneral.jus.gov.on.ca/english/private_prosecution.php* (last modified Oct. 29, 2015) (describing private prosecutions and noting "the Criminal Code and the Crown Attorneys Act authorize Crown Counsel to supervise privately laid charges to ensure that such prosecutions are in the best interest of the administration of justice" and to "take over the prosecution" of indictable offences); Private Prosecutions, Pub. Prosecution Serv. Can.,*http://www.ppsc-sppc.gc.ca/eng/pub/fpsd-sfpg/fps-sfp/fpd/ch26* .html (last modified Dec. 24, 2008). For Australia, see, for example, Director of Public Prosecutions Act 1983 s 10(2) (Austl.) (preserving private prosecution); id. s 9(5) (giving the Director power to take over a prosecution for a Commonwealth offence that has been instituted by another and either carry on or discontinue it); Annual Report 2014-15, Commonwealth Dir. Pub. Prosecutions (2015), *https://www.cdpp.gov.au/2014* -15-annual-report-html-0 (reporting three private prosecutions in 2014-15, two of which were discontinued by the DPP); see also Director of Public Prosecutions Act 1984 (Queensl.) s 10(c)(2) (Austl.) (giving DPP the power to "take over and conduct" criminal proceedings); Director of Public Prosecutions Act 1986 (N.S.W.) s 9 (Austl.) (using similar language to Commonwealth DPP Act); Dir. of Pub.

correlative rather than causal, but it nonetheless suggests a reason for why state justice systems took a different path from other common-law jurisdictions and abolished private charging. Local white majorities had little need for a structural check on prosecutors they elected, and they likely did not want a way for African-American citizens to challenge prosecutors and independently pursue their interests in criminal courts. Prosecution redundancy would reduce the control of local majorities to dictate enforcement policies, including preferences for selective underenforcement.

B. Judicial and Administrative Review of Decisions Not to Charge

A second structure that creates some redundant authority over decisions not to prosecute exposes those prosecutorial decisions to review, either by courts or by supervising officials within an administrative hierarchy. As with private prosecution, this mechanism is almost nonexistent among U.S. jurisdictions, with the significant exception of federal law. But this option has gained ground elsewhere, in England and throughout E.U. countries. In all these contexts, its adoption responds to demands for expanded victims' rights in the criminal process. This Section briefly surveys prominent examples of noncharging review in federal law and Europe, then considers why state justice systems uniformly reject it.

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1. Oversight of Declination Decisions in Europe

Pursuant to an E.U. Directive, [100] twenty-five of the twenty-eight member states of the European Union grant crime victims formal rights to seek review of decisions not to file criminal charges based on their complaints. [101] The details of these review procedures vary. Some authorize judicial review of prosecutors' decisions; most jurisdictions, including Scotland and France, provide at least a means for review by independent officials within the prosecution agency, perhaps with an additional possibility for judicial review. [102] Although E.U. nations with common law-based legal systems, such as Ireland, Northern Ireland, [103] and England, have adopted versions of this practice, the **[*875]** practice is more established in civil law jurisdictions, likely because it is consistent with the longstanding duty in some civil law countries of mandatory prosecution. [104]

Prosecutions Vict., Annual Report 14-15, at 86,*http://www.opp.vic.gov.au/getattachment/8bc2fefc-8715-4516-9fb8-57ea3e4b6342/OPP_Annual_Report_14_15_Full_web* .aspx (noting that pursuant to discretion granted under § 22(b)(ii), the DPP took over and dismissed one private prosecution instituted for an "improper purpose"). Regarding New Zealand, see Criminal Disclosure Act 2008 (N.Z.); Criminal Procedure Act 2011 (N.Z.); Crown Law, Solicitor-General's Prosecution Guidelines 4 (2013), http://www .crownlaw.govt.nz/assets/Uploads/Prosecution-Guidelines/prosecution-guidelines-2013.pdf. Scotland is much more restrictive. See Criminal Procedure (Scotland) Act 1975, c. 21, § 310A (Scot.) (stating in a provision added in 1996 that "except where any enactment otherwise expressly provides, all prosecutions under this Part of this Act shall be brought at the instance of the procurator fiscal"); Frazer McCallum, Scottish Parliament Info. Ctr., The Scottish Criminal Justice System: The Public Prosecution System 2 (2016), http://www .parliament.scot/ResearchBriefingsAndFactsheets/S5/SB_16-47_The_ Scottish_Criminal_Justice_System_The_Public_Prosecution_System.pdf ("Prosecutions by private individuals are possible in some circumstances, but are very rare."). Before 1995, judicial approval was granted for only two private prosecutions in Scotland in the twentieth century. See Woman Loses Attempt to Bring Private Prosecution. Judges Reject Move on Rape Case, Herald Scot. (June 1, 1995), *http://www.heraldscotland.com/sport* /spl/aberdeen/woman-loses -attempt-to-bring-private-prosecution-judges-reject-move-on-rape-case-1 .677607.

[72] See Challenging the Decision Not to Prosecute, Eur. Union Agency for Fundamental Rts. (2014) [hereinafter FRA Report], *http://fra.europa.eu/en/publications-and-resources/data-and-maps/comparative-data/victims-support* -services/prosecution (summarizing policies of EU nations). This source arguably overstates private-prosecution jurisdictions by characterizing "private prosecution" broadly to include states, such as France, in which victims can initiate petty offense charges and inquiries by investigating judges but may pursue only civil actions without public prosecutors. See Country Studies for the Project "Victim Support Services in the EU: An Overview and Assessment of Victims' Rights in Practice,' Eur. Union Agency for Fundamental Rts. (Feb. 2016), *http://fra.europa.eu/en/country-data/2016/country-studies-project-victim-support* -services-eu-overview-and-assessment-victims. For separate developments in the Council of Europe, including standards for victim assistance and procedural rights to be informed about and participate in criminal proceedings, and for a victim's right to review decisions not to prosecute, see Comm. of Ministers, Council of Eur., Recommendation Rec(2006)8 of the Committee of Ministers to Member States on Assistance to Crime Victims (2006); Comm. of Ministers, Council of Eur., Recommendation No. R (87) 4 of the Committee of Ministers to Member States Concerning the Simplification of Criminal Justice (1987); Comm. of Ministers, Council of Eur., Recommendation No. R (87) 4 of the Committee of Ministers to Member States on the Protection of Workers in the Event of

The mandatory prosecution duty, known as the "legality principle," is itself a safeguard against selective underenforcement due to bias or favoritism. It is primarily an anti-discrimination injunction, intended to ensure that prosecutors treat like cases alike, rather than a mandate to ensure public safety and order through full enforcement. [105] Administrative and judicial enforceability of that duty is intended to ensure its effectiveness.

2. Oversight of Declination Decisions in England and Wales

The United Kingdom was an E.U. member state when the victim's right Directive was issued, [106] and its largest criminal **[*876]** justice system - the combined jurisdictions of England and Wales - provides several grounds on which victims or other aggrieved parties may obtain both administrative and judicial review of non-prosecution decisions. Yet the reasons for this relate foremost to public rather than private interests: "a decision not to prosecute, especially in circumstances where it is believed or asserted that the decision is or may be erroneous, can affect public confidence in the integrity and competence of the criminal justice system." [107]

In line with other E.U. member states, English victims can seek administrative review within the Crown Prosecution Service. The process appears to be meaningful; in recent years, between seven and thirteen percent of prosecution decisions challenged in this way have been reversed. [108] Moreover, noncharging decisions are also subject to judicial review - a policy rarely seen in other common law jurisdictions. [109] The standard is deferential, but English courts do periodically overturn non-prosecution decisions after evaluating them against written standards in the Code for Crown Prosecutors and other guidelines. [110] English courts have disapproved of decisions not to prosecute upon finding they were based on an unlawful policy [111] or were found to be **[*877]** "perverse" under a general reasonableness standard. [112] And in particular contrast to U.S. law with regard to lethal force by police, English judges give special scrutiny to cases that arise from deaths in state custody, which by their nature raise the specter of prosecutorial favoritism toward fellow law enforcement officials. [113]

Employers' Insolvency (1987); Comm. of Ministers, Council of Eur., Recommendation No. R (85) 11 of the Committee of Ministers to Members States on the Position of the Victim in the Framework of Criminal Law and Procedure (1985). For analysis of Directive 2012/29 as well as Council of Europe recommendations, see Buczma, supra note 61, at 242-48. In Germany, victims can initiate a private prosecution for certain minor offenses, and for more serious offenses may take a formal role as accessory prosecutors with rights to participate in proceedings and to be heard before charges are dismissed. See Strafprozessordnung [StPO] [Code of Criminal Procedure], §§374-94, translation at https://www.gesetze-im-internet.de/englisch_ stpo/englisch_stpo.html (describing rights of privateklage); id. §§153, 395-402 (describing rights of nebenklager); see also id.§§403-406c (describing compensation); id. § 172 (describing victim's right to seek court order to compel public prosecution); Michael Bohlander, Principles of German Criminal Procedure 25, 64 (2012).

[73] This describes, for example, the German system that allows private parties to act as accessory prosecutors alongside public prosecutors. See Strafprozessordnung [StPO] [Code of Criminal Procedure],§§153, 395-402 (describing rights of nebenklager).

[74] See, e.g., Commonwealth Dir. of Pub. Prosecutions, supra note 71 (reporting three private prosecutions in federal courts in 2014-15).

[75] By the end of the nineteenth century, state and federal justice systems were firmly committed to the principle that prosecution is an exclusive power of public officials in which private victims have no role or standing. See Malley v. Lane, 115 A. 674, 676 (Conn. 1921); cf. Linda R.S. v. Richard D., 410 U.S. 614, 619 (1973) ("[A] citizen lacks standing to contest the policies of the prosecuting authority when he himself is neither prosecuted nor threatened with prosecution... . In American jurisprudence at least, a private citizen lacks a judicially cognizable interest in the prosecution or nonprosecution of another.").

[76] See Manikis, supra note 66.

[77] See Jacoby, supra note 70, at 5-7; Jack M. Kress, Progress and Prosecution, 423 Annals Am. Acad. Pol. & Soc. Sci. 99, 100 (1976); Allen Steinberg, From Private Prosecution to Plea Bargaining: Criminal Prosecution, the District Attorney, and American Legal History, 30 Crime & Delinq. 568, 571-72 (1984) (finding that private prosecutions predominated in the colonies). In 1704, Connecticut established what was probably the first public prosecutor's office. See Jacoby, supra note 70, at 17; Kress, supra, at 103. When Blackstone described criminal law as predominantly directed at public wrongs, he did so in the context of a late eighteenth century justice system in which private prosecutions were common. See 4 William Blackstone, Commentaries on the Laws of England: Book the Fourth 5-6 (1795).

[78] See Jacoby, supra note 70, at 23 (concluding that after 1789 "for the first half-century at least" the public prosecutor was "clearly a minor actor in the court's structure" with a more judicial than executive role); Stephanie A.J. Dangel, Note, Is Prosecution a Core Executive Function? Morrison v. Olson and the Framers' Intent, 99 Yale L.J. 1069, 1073 (1990) ("First, colonial attorneys general and district attorneys performed non-prosecutorial tasks ... ."); see also Steinberg, supra note 77, at 577 (noting public prosecutor's duties included responsibility

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3. Federal Oversight of Declination Decisions

In the United States, only the federal justice system provides for a process of administrative review somewhat comparable to those in E.U. member states. Federal law grants victims a right to seek review of prosecutors' decisions within the Department of Justice hierarchy, although it also explicitly bars judicial review of Justice Department decisions in this process. [114] Although decision makers in an internal review process have less institutional independence from those they review than do judges engaged in judicial review, they also have a comparative advantage in institutional expertise, which could translate into less deference to, and more meaningful oversight of, front-line prosecutors.

In addition, federal law guarantees victims "the reasonable right to confer with the attorney for the Government in the case." [115] The Department of Justice interprets this not to create a right to confer before charges are filed, reasoning that no "case" exists until charges are filed. [116] Some lower courts have interpreted the statute differently, however, and concluded that it **[*879]** creates an enforceable right for victims to confer with prosecutors before, and about, the charging decision. One held that prosecutors cannot enter a non-prosecution agreement with a suspect until they confer with victims, and that if they fail to do so the court can order prosecutors to re-open the non-prosecution agreement. [117] A few other lower federal courts have reached similar conclusions, [118] although at least two have opposing conclusions. [119]

Even in its stronger form, this is a limited entitlement, in effect, to an opportunity to try to influence charging decisions. Even the most aggressive federal courts on this point do not examine prosecutors' good faith during consultations or their reasons for disagreeing with victims. In sum, neither the consultation right nor the right to review by Justice Department supervisors infringes federal prosecutors' monopoly power over charging from judicial oversight.

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for the court calendar). England had no full-scale prosecution agency until the creation of the Crown Prosecution Service in the Prosecution of Offences Act 1985. See Prosecution of Offences Act 1985, c. 23. The Director of Public Prosecutions office was established in 1879, but it supplemented rather than displaced private prosecution. See Glanville Williams, The Power to Prosecute, Crim. L. Rev. 596, 601-03 (1955) (noting 1879 creation of Director of Public Prosecutions and describing police as de facto public prosecutors).

[79] See Parrillo, supra note 58.

[80] Professional police forces did not arise until the 1850s, so victims investigated crimes and arrested offenders. See Peggy M. Tobolowsky, Victim Participation in the Criminal Justice Process: Fifteen Years After the President's Task Force on Victims of Crime, 25 New Eng. J. Crim. & Civ. Confinement 21, 25 (1999) (explaining that, to arrest offenders, victims could enlist the "aid of the local watchman, justice of the peace, or constable for whose assistance the victim paid").

[81] See, e.g., Mike McConville & Chester Mirsky, Jury Trials and Plea Bargaining: A True History 25-42 (2005) (describing early systems in New York of judicial or gubernatorial appointment of prosecutors, until the office first became elective in 1847); Allen Steinberg, The Transformation of Criminal Justice: Philadelphia, 1800-1880, at 152-58 (1989) (stating that Philadelphia first elected its district attorney in 1850). Prosecutors as well as judges became elected positions in many states as part of a wave of state constitutional reform in the mid-nineteenth century. See, e.g., Ind. Const. art. 7, § 11 (1851); Md. Const. art. 5 (1851); see also id. art. 3 (forbidding creation of state attorney general office); Mich. Const. arts. 8, 10 (1850); N.Y. Const. art. 10 (1846); N.C. Const. art. 4, § 29 (1868); Va. Const. art. 6,§§6, 8, 30 (1851).

[82] See Jacoby, supra note 70, at 6 (arguing that American prosecutors evolved from weak to strong figures largely because they were popularly elected and tied to local government organization). Public and private prosecutors coexisted for a few decades in some places. See *Cantrell v. Commonwealth, 329 S.E.2d 22, 25 (Va. 1985)* (describing the history of private prosecution in Virginia); State v. Stein, 30 S.C.L. (1 Rich.) 189, 190 (S.C. 1845) (affirming that private individuals may file criminal or civil actions for the same offense but must elect the form before trial); Corley v. Williams, 17 S.C.L. (1 Bail.) 588, 588-89 (S.C. 1830) (providing an example of private prosecution). Pennsylvania and New York relied heavily on private prosecutors for criminal law enforcement before 1850. See *Stewart v. Sonneborn, 98 U.S. 187, 198 (1879)* (Bradley, J., dissenting) ("Every man in the community, if he has probable cause for prosecuting another, has a perfect right, by law, to institute such prosecution, subject only, in the case of private prosecutions, to the penalty of paying the costs if he fails in his suit."); McConville & Mirsky, supra note 81 (describing New York courts with private prosecutors and, prior to 1847, judicial or gubernatorial appointments of public prosecutors); Steinberg, supra note 81, at 24-69, 152-57 (describing private prosecutions, screened by aldermen acting as magistrates, and creation of elected district attorney's office in 1852).

[83] Robert M. Ireland, Privately Funded Prosecution of Crime in the Nineteenth-Century United States, 39 Am. J. Legal Hist. 43, 44-45 (1995) (recounting numerous comments by state supreme courts on the low quality and inadequate funding of public prosecutor offices).

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4. Oversight of Declination Decisions in State Justice Systems

State justice systems do not go as far as the federal system does, much less provide the kind of oversight or victim recourse that European systems now offer. And this is so despite the fact that all states have adopted substantial victims' bills of rights, nearly all of which include rights for victims to consult with prosecutors. Most make clear that the consultation right attaches only after the prosecutor decides to file charges. [120] Rights of administrative review are rare. [121] One reason for that is surely structural. The U.S. Department of Justice is a hierarchically organized agency within which all federal prosecutors operate, a structure that enables supervisory and quasi-independent review within the agency. But few states follow that model. Instead, prosecutors in most states are locally elected and operate **[*881]** autonomously from state justice departments or attorneys general, which generally exercise little, if any, oversight. [122] Administrative review of state prosecutors' charging decisions is simply not feasible without major reorganization of state justice systems.

That structural barrier probably explains why state prosecutors' decisions are functionally immune to administrative oversight, but the lack of judicial oversight has a different origin. In accord with common law tradition, state and federal courts have never meaningfully reviewed public prosecutors' noncharging decisions. [123] In particular, they have unambiguously rejected victims' claims of standing to challenge those decisions. [124] A few **[*882]** limited exceptions prove the rule. In cases of private criminal complaints filed by alleged victims, Colorado, Michigan, Nebraska, and Pennsylvania authorize judges to review public prosecutors' decisions not to charge. [125] Even when statutes grant courts the power to review (or even mandate review) of charging and dismissal decisions, state judges consistently have refused to scrutinize the merits of prosecutors' judgments. Many states have replaced the common law rule that gave prosecutors complete discretion to nolle prosequi (or dismiss) any criminal charge with statutes that require judges to confirm that non-prosecution is in the interest of justice. [126] Yet courts uniformly refuse to engage in meaningful review, inferring instead that those statutes require deference to prosecutors. [127]

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[84] See *Erikson v. Pawnee Cty. Bd. of Cty. Comm'rs, 263 F.3d 1151, 1154 (10th Cir. 2001)* (finding no due process violation because private attorney assisting prosecution did not "control[] critical prosecutorial decisions"). The first states to prohibit privately funded prosecutors even under supervision of public prosecutors were Massachusetts, Michigan, and Wisconsin. See *Commonwealth v. Gibbs, 70 Mass. (4 Gray) 146, 147-48 (1855); Meister v. People, 31 Mich. 99, 104-06 (1875); Biemel v. State, 37 N.W. 244, 248-49 (Wis. 1888).* See also Ireland, supra note 83, at 49 (listing fifteen states that still approved privately funded prosecutors in 1900). Other states abolished this practice more recently. See *State ex rel. Wild v. Otis, 257 N.W.2d 361, 365 (Minn. 1977)* (holding that party has no right of private prosecution); *State v. Harrington, 534 S.W.2d 44, 48 (Mo. 1976)* (holding that a right of private prosecution should not be permitted); *People v. Calderone, 573 N.Y.S.2d 1005, 1007 (N.Y. City Crim. Ct. 1991)* (concluding that under New York law private prosecutions by interested parties or their attorneys present inherent conflicts of interest which violate defendants' due process rights); *State v. Best, 186 S.E.2d 1, 4 (N.C. 1972)* (noting that a public prosecutor must be in charge of all prosecutions).

[85] See, e.g., N.J. Ct. R. 3:23-9 (permitting private prosecutor with approval of the public prosecutor and court); N.J. Ct. R. 7:8-7(b) (permitting private prosecutor for cross-complaints with court approval); *State v. Harton, 296 S.E.2d 112, 113 (Ga. 1982)* (private party not allowed to prosecute without state approval); *State v. Moose, 313 S.E.2d 507, 512-13 (N.C. 1984)* (stating that private attorneys may assist public solicitors where public solicitors retain control and management of prosecution); *Cantrell, 329 S.E.2d at 25* (stating that private attorneys may assist commonwealth attorneys with the permission of the prosecutor and the court); *63C Am. Jur. 2d Prosecuting Attorneys § 12* (2018) (citing authority in some states that private attorneys may assist public prosecutors). For a state statute that apparently gives the "prosecuting witness" a right to pay a private attorney to assist the public prosecutor without the latter's consent, see *Kan. Stat. Ann. § 19-717* (2017); see also John D. Bessler, The Public Interest and the Unconstitutionality of Private Prosecutors, *47 Ark. L. Rev. 511, 529, nn.71-72 (1994)* (citing cases in majority of states allowing private prosecutors to assist in public prosecutions). Bessler identifies three states that "allow private prosecutors to participate without the consent or supervision of the district attorney," but in all three states, the public prosecutor initiated and litigated the criminal charge, while the private prosecutor assisted in the litigation as counsel to a victim. *Id. at 529, n.71.*

[86] 234 Pa. Code § 506 (2001); *In re Private Criminal Complaints of Rafferty, 969 A.2d 578, 582 (Pa. 2009)* (discussing the ability of a prosecutor to approve or disapprove of private complaints). Judges may authorize private counsel to take over as prosecutor upon finding that a district attorney has "neglected or refuseed to prosecute" a properly grounded charge. See 16 Pa. Stat. and Cons. Stat. Ann. § 1409 (West

[*883] This is a stark contrast with European justice systems, but U.S. jurisdictions are not alone in shielding prosecution decisions from judicial oversight. Aside from England and Wales, courts in other common law jurisdictions - notably Canada and Australia - take roughly the same approach and defer to prosecutorial charging discretion. [128]

5. Summary of Declination Oversight

Both private prosecution and review procedures provide a kind of redundancy that checks prosecutorial declination decisions, and both can do so in service of public interests as well as victims' private interests. Both options have some capacity to challenge prosecutorial judgments affected by political or personal biases, institutional allegiances (especially between police and local politicians), or other illicit sources of favor or disfavor. As one commentator put it in the English context, private prosecution authority recognizes that victims possess some capacity to be independent "assessors of the evidence as well as the public interest." [129] Review procedures enable judges and supervisory **[*884]** officials to do much the same thing, without the cost barriers for victims posed by private prosecutions. (Although it may well be that poorer victims are less likely even to petition for review, especially if they lack legal counsel to press their review requests.)

Why, then, have U.S. jurisdictions so uniformly rejected both options? As noted, both racial politics and the power of common law tradition are probable contributing reasons. [130] Another is the singular choice of most state justice systems to make prosecutors locally elected officials, which does much to prevent kinds of over-and underenforcement disfavored by local majorities. That, in turn, likely reduces pressure for reforms that would improve other safeguards against decisions not to prosecute - especially decisions that cut against popular local preferences, which in many communities include rigorous

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2016) (authorizing victims dissatisfied with public prosecutor to petition the court and granting courts the power to allow victim's attorney to take over as private prosecutor).

[87] See 12 *R.I. Gen. Laws§§12-4-1*, *12-4-2*, *12-4-6*, *12-12-1.3* (2017); *Cronan ex rel. State v. Cronan, 774 A.2d 866, 871 (R.I. 2001)* (approving private misdemeanor prosecution for assault under state statutes).

[88] See *State v. Martineau, 808 A.2d 51, 54 (N.H. 2002);* see also *State by Tucker v. Gratta, 133 A.2d 482, 482 (N.H. 1957)* (holding that state prosecutors retain power to dismiss private criminal complaints).

[89] See, e.g., *N.C. Gen. Stat.§§15A-303*, 304 (2016); *Moose, 313 S.E.2d at 512-13* (requiring that the public prosecutor remain in continuous control of the case). Scattered marginal remnants of private enforcement may remain elsewhere, such as an Oklahoma statute providing that prosecutions for adultery (a felony) may be "commenced and carried on against either of the parties to the crime only by his or her own husband or wife." *Okla. Stat. tit. 21 § 871* (2017) ("Prosecution for adultery can be commenced and carried on against either of the parties to the crime only by his or her own husband or wife as the case may be, or by the husband or wife of the other party to the crime.").

[90] The Royal Commission on Criminal Procedure, 1981, Cmnd. 8092, P 7.47 (UK); see also Gouriet v. Union of Post Office Workers [1978] AC (HL) 435 at 477 (Eng. and Wales) (private prosecutions are a "valuable constitutional safeguard against inertia or partiality on the part of the authority"); cf. Manikis, supra note 66, at 67, 71 (describing review as a means to correct prosecution errors).

[91] *In re Hickson, 2000 PA Super 402, PP 22, 41;* see also *In re Piscanio, 344 A.2d 658, 660-61 (Pa. Super. Ct. 1975)* ("The judge's independent review of the complaint checks and balances the district attorney's decision and further hedges against possibility of error.").

[92] *United States v. Armstrong, 517 U.S. 456, 461-64 (1996).*

[93] Arguments for strengthening the doctrine to make claims easier to pursue are common. See, e.g., Richard H. McAdams, Race and Selective Prosecution: Discovering the Pitfalls of Armstrong, *73 Chi.-Kent L. Rev. 605, 606 (1998)* (discussing use of the equal protection doctrine but challenging current precedent).

[94] Grand juries remain a fixture in the federal system and in roughly half the states. See Sara Sun Beale et al., Grand Jury Law and Practice § 1:5 (2d ed. 2017) (describing grand jury status and rules in states and noting states that have partially or wholly abolished grand juries); Andrew D. Leipold, Why Grand Juries Do Not (and Cannot) Protect the Accused, *80 Cornell L. Rev. 260, 274-75 (1995)* (noting difficulty of getting data on grand jury screening and offering reasons why grand juries rarely reject requests for indictments). To extend the comparison, public officials (judges) have a long track record of doing the same task that trial and grand juries do. That available substitute did not lead to calls for juries' abolition. Yet the availability of public prosecutors as replacements led to the U.S. jurisdictions to abolish private prosecutors.

prosecution of excessive police uses of force. Finally, another institution responds to some of the same underenforcement problems that private prosecution and judicial review could address - redundant prosecution authority in a federal system.

C. Federalism Safeguards on Prosecutorial Discretion

The scope of the U.S. federal criminal code expanded vastly in the twentieth century, as did the federal government's institutional capacity to enforce that code and its regulatory authority more generally. The result has been a distinctive form of criminal justice federalism: federal enforcement authority wholly overlaps the territorial scope of state criminal law, and the federal code substantially overlaps much of what is covered in state criminal codes. The resulting structure of redundant federal-state authority has evolved into a means - unusual even among federal nation-states - to second-guess and effectively trump state prosecutors' declination decisions without empowering courts or private parties.

No other nation built on a federal model incorporates nearly **[*885]** the same degree of redundancy between state and federal justice systems. [131] The more common model of criminal justice federalism is found in Canada and Germany: each has a single national criminal code that is administered by separate state-level prosecution agencies and court systems. [132] Other federal states follow the U.S. model and have separate criminal codes, prosecution agencies, and court systems in each state as well as for the federal government. Australia follows this model, but the scope and jurisdiction of Australian federal criminal law is much more limited than is U.S. federal law; federal crimes are largely confined to offenses that implicate distinct federal interests - it is probably closer to U.S. federal criminal law in 1910 than 2010. The result is that in Australia federal criminal law enforcement overlaps much less with state criminal law. [133]

The broad redundancy provided by U.S. federalism enables federal prosecutors to serve as checks on underenforcement by state prosecutors, at least for some large and important categories **[*886]** of crime. In effect, federal prosecutors can review the declination decisions of state prosecutors - as well as the adequacy and success of their prosecutions - and then decide whether to file federal charges in cases that their state counterparts declined to pursue, charged too leniently, or in which they failed to win a conviction or sufficiently harsh sanctions. (In theory state prosecutors conduct the same oversight over much of

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[95] See George Fisher, The Jury's Rise as Lie Detector, *107 Yale L.J. 575, 671-96 (1997)* (discussing the impact of racial policies in post-Civil War jury and court processes).

[96] I am aware of no historical research on African American private prosecutors, and I have found no evidence of any in case law or general accounts of private prosecutions.

[97] See, e.g., Fisher, supra note 95, at 684 n.514 ("Denial to the freedman of the power to testify in court against the white man ... strikes not at a mere civil franchise, but at a natural right - the right of protecting life and property. When a white man may take a freedman's life or property with impunity, if no other white men be present, the freedman has no security for either." (quoting The Progress of Reconstruction, N.Y. Times, Oct. 3, 1865, at 4)).

[98] When Southern states were compelled to grant African American citizens litigation rights, they imposed strict conditions, permitting African Americans the right to testify only when the crime victim (or the opposing civil litigant) was African American. Id. at 684. Those limitations likewise restricted African Americans' private prosecution authority, although in many places racial customs, backed by the prospect of racial violence, was probably discouragement enough. See generally Douglas A. Blackmon, Slavery by Another Name: The Re-Enslavement of Black Americans from the Civil War to World War II (2008) (discussing history of African Americans' distrust of America's judicial system); Nicholas Lemann, Redemption: The Last Battle of the Civil War (2007) (exploring incidents after the Civil War and the impact on politics during the Reconstruction Era).

[99] Michael J. Klarman, From Jim Crow to Civil Rights: The Supreme Court and the Struggle for Racial Equality 49-51 (2004). Northern states were not models of race-blind democracy. Connecticut voters in 1865 rejected a proposal to enfranchise African American citizens in their state. Fisher, supra note 95, at 685.

[100] See Council Directive 2012/29, art. 11, 2012 O.J. (L 315) 57 (EC) (EU), *http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32012L0029* (requiring member states to give crime victims means to challenge non-prosecution decisions, either through private prosecution or a right to review).

[101] See FRA Report, supra note 72 (summarizing policies of EU member states and noting that only Cyprus and Malta provide victims neither right).

federal enforcement practice, but this is less common.) [134] State prosecutors' decisions, at least for certain categories of serious wrongdoing, face de facto review by federal executive officials.

Or so the law for a century has permitted. The constitutional double jeopardy doctrine since at least 1922 has recognized the "dual sovereignty" of state and federal governments. Notwithstanding the guarantee that no person shall "be subject for the same offence to be twice put in jeopardy," the Double Jeopardy Clause has been understood not to preclude federal prosecutors' power to charge a person who has previously been prosecuted by state officials for the same criminal conduct, and federal prosecutions likewise do not limit subsequent state enforcement efforts. [135] By granting certiorari in United States v. Gamble this term, [136] the U.S. Supreme Court is set to revisit this doctrine, which provides the foundation for the federalism-based check on underenforcement.

Federal prosecutors do not attempt to keep an eye on all state prosecution decisions and practices, and federal criminal **[*887]** law is not fully coextensive with state criminal law; significant gaps are discussed in the next Part. But the substantive redundancy is considerable. For some areas of dual authority - such as drug crimes, fraud, child pornography, and human trafficking - federal and state agencies often coordinate investigative efforts and divide up prosecution responsibilities. But federal Justice Department policy to exercise oversight of state enforcement practices in certain categories of crime is deliberate and formalized. Notable examples include state and local government corruption, excessive use of force and other wrongdoing by police, and other criminal civil rights violations. [137] Especially in these areas, federal prosecutors assess whether to file their own charges in cases in which their state counterparts declined to charge, charged too leniently, or in which they failed to win appropriate convictions. Federal prosecution in the wake of state declination is hardly the norm - it should not be, if state prosecutors decline cases for the right reasons [138] - but federal officials do remedy meaningful enforcement gaps left by state prosecutors. [139]

Functionally, this inter-governmental model of review resembles intra-agency administrative review with greater independence between initial decision makers and subsequent reviewers. Oversight of state prosecutors rests with the policy **[*888]** priorities of federal executive branch officials. The Justice Department has well-established written guidelines for much of this oversight activity, although they are not formally binding. [140] Although the Justice Department bureaucracy has a stronger

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[102] On Scotland, see Victims and Witnesses (Scotland) Act 2014, (ASP 1) § 4 ("The Lord Advocate must make and publish rules about the process for reviewing, on the request of a person who is or appears to be a victim in relation to an offence, a decision of the prosecutor not to prosecute a person for the offence."); Crown Office & Procurator Fiscal Serv., Lord Advocate's Rules: Review of a Decision Not to Prosecute - Section 4 of the Victims and Witnesses (Scotland) Act 2014, at 5 (2015), http://www.copfs.gov.uk/images/Documents/Victims_and_Witnesses/Lord%20Avocates%20Rules%20-% 20June%2015%20v2.pdf. On France, see Novokmet, supra note 70, at 101-02. In addition to judicial review, England also provides administrative review. See Dir. of Pub. Prosecutions, Victims' Right to Review Guidance 6-9 (2016), https://www.cps.gov.uk/sites/default/files/documents/publications/vrr_ guidance_2016.pdf (noting that victims may seek administrative review of decisions not to prosecute, which are checked in a local CPS office by a prosecutor who has not been involved with the case previously, then at the victim's request in a review by the Appeals and Review Unit); Victims' Right to Review Scheme, Crown Prosecution Serv., https://www.cps. gov.uk/legal-guidance/victims -right-review-scheme (last updated July 2016). Decisions are reviewed as questions of law - that is, whether they are correct as a matter of law, even if reasonable.R v. Killick [2011] EWCA (Crim) 1608, [2012] 1 Crim. App. 10 [48] (recognizing victim right to review under EU Directive art. 10, and noting original prosecution decision was reasonable but wrong); see also Keir Starmer, Human Rights, Victims and the Prosecution of Crime in the 21st Century, Crim. L. Rev. 777, 783-84 (2014) (describing aims of review policy).

[103] See Carlin v. Dir. of Pub. Prosecutions [2010] IESC 14, 3 IR 547, at P 12 (Ir.) ("If ... it can be demonstrated that [the DPP] reaches a decision mala fide or influenced by an improper motive or improper policy then his decision would be reviewable by a court. To that extent I reject the contention again made on behalf of this respondent that his decisions were not as a matter of public policy ever reviewable by a court." (quoting State (McCormack) v. Curran, [1987] ILRM 225, 237 (Ir.))); Office of the Dir. of Pub. Prosecutions, The Role of the DPP 16 (2015), https://www.dppireland.ie/filestore/documents/victims_ directive_publications/ENGLISH_-_Role_of_the_DPP.pdf (noting crime victims, among others, can seek DPP review of prosecutors' decisions). On Northern Ireland, see Pub. Prosecution Serv. for N. Ir., Victims of Crime: Requesting a Review of a Decision Not to Prosecute 2-4 (2017), https://www.ppsni.gov.uk/Branches/PPSNI/PPSNI/Files/Documents/Rquests%20For% 20Review/Victims%20of%20Crime%20-%20Requesting%20a%20Review% 20of%20a%20Decision%20not%20to%20Prosecute%20(October%202017).pdf.

institutional culture of professionalism than many state prosecutor offices, departmental policies and priorities can change substantially with presidential administrations - as they have recently. [141] Nonetheless, this federalism-based model of prosecutorial oversight has an advantage shared by the administrative review schemes within single prosecution agencies. In both settings, those with review power are prosecutors who should have greater institutional competence and legitimacy to second-guess other prosecutors' charging decisions, and consequently less inclination than courts to defer to prosecutorial judgments.

This federalist model of enforcement redundancy did not evolve from earlier common law institutional arrangements, like private prosecution, nor from the modern victims' rights movement, like judicial and administrative review of decisions not to prosecute. Federal criminal law enforcement expanded for several reasons, but behind many of those reasons is a common purpose: to remedy glaring patterns of underenforcement by the states. For example, federal law and institutional capacity (such as the advent of the Federal Bureau of Investigation) expanded in response to states' inability to confront adequately the rise of interstate violence and drug crimes (as well as, for a time, prohibition on alcohol manufacture and distribution). [142] Federal law **[*889]** took on the primary role in combatting local government corruption - including police corruption and excessive uses of force - which local prosecution agencies often lacked the ability, or political independence, to confront. [143] And federal law has long attempted to fill the gap when racially biased local police, prosecutors, and juries declined to arrest, prosecute, or convict suspects - especially white ones - who victimized black citizens. [144] In sum, the redundant enforcement

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[104] Strafprozebetaordnung [StPO] [Code of Criminal Procedure], §§152, 160, 170, translation at *https://www.gesetze-im-internet.de/englisch_* stpo/englisch_stpo.html (Ger.) (defining prosecution duty to investigate suspected crime and indict when evidence is sufficient); id. §§171-75 (providing for judicial orders to prosecute, including victim's right to seek order compelling prosecution); Bohlander, supra note 72, at 25-27, 67-71, 103-04 (describing German procedures to compel prosecutions under statutory legality principle); Novokmet, supra note 70, at 92-93. Failures to charge when required to do so can expose a prosecutor to discipline or even criminal liability. See Strafgesetzbuch [StGB] [Penal Code], § 339, translation at https://www .gesetze-im-internet.de/englisch_stgb/englisch_stgb.html (Ger.) (establishing that rechtsbeugung, or perversion of justice, is punishable by one to five years in prison); id.§§258, 258a (establishing punishment for police or prosecutor's failure to investigate or prosecute colorable offenses).

[105] See Shawn Marie Boyne, The German Prosecution Service: Guardians of the Law? 8-10, 91-92 (2014) (quoting Hans-Heinrich Jescheck, The Discretionary Powers of the Prosecuting Attorney in West Germany, 18 Am. J. Comp. L. 508, 511 (1970)); Markus D. Dubber, Criminal Process in the Dual Penal State: A Comparative-Historical Analysis, in *Oxford Handbook of Criminal Process, supra* note 60; see also Klaus Sessar, Prosecutorial Discretion in Germany, in The Prosecutor 255, 272-73 (William F. McDonald ed., 1979). For the German example of this principle, see Strafprozebetaordnung [StPO] [Code of Criminal Procedure],§§152, 160, 170, translation at *https://www.gesetze-im-internet.de/englisch_stpo/englisch_stpo.html* (Ger.) (defining prosecution duty to investigate suspected crime and indict when evidence is sufficient).

authority developed as part of the modern model U.S. federalism has much in common, in functional terms, with private prosecution and review of prosecutorial declination decisions. All are mechanisms to guard against unjustified nonenforcement, or underenforcement, by jurisdictions' primary prosecution agencies. The next Part examines the relative strengths of these alternatives.

III. PROS AND CONS OF FEDERALISM-BASED ENFORCEMENT REDUNDANCY

A. Comparative Limits of Enforcement-Oversight Strategies

Each of the institutional approaches to reducing underenforcement of criminal law by public prosecutors has comparative strengths and weaknesses. All three share the common virtue of being a means to reduce instances of bias, favoritism, or other misjudgments that result in unjustified nonenforcement. All three enable outside reevaluation of declination decisions. Private prosecution empowers motivated private parties - crime victims - to initiate the challenge to a public prosecutor's decision not to charge by filing charges themselves. The same is true in jurisdictions that subject declination decisions to formal administrative or judicial review; victims trigger that process by petitioning for an independent evaluation. Both of those practices harness the motivations of interested private parties to, in effect, screen which declination decisions should be subject to reassessment, although private prosecution poses a significant cost barrier for victims who want to take advantage of it. At the same time, both of these practices give public officials the final **[*890]** word on whether a prosecution (public or private) will proceed.

The federalism route to prosecutorial oversight, by contrast, gives private parties no formal role, although victims can file complaints and lobby federal prosecutors just as they can with local police and prosecutors for any alleged crime. Put differently, federal prosecution as check on state underenforcement rests more directly on the initiative, diligence, and judgment of federal prosecutors than private victims. In some areas, federal commitment is significant. [145] But it also varies with the policy priorities of presidential administrations, which can vary considerably in their commitment to fighting certain kinds of crimes and to federal oversight of state criminal justice administration. [146]

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[106] The U.K. is scheduled to leave the European Union in 2019. See Alex Hunt & Brian Wheeler, Brexit: All You Need to Know About the U.K. Leaving the E.U., BBC (Sept. 13, 2018), https ://*www.bbc.co.uk/news/uk-politics-32810887*.

[107] R (Da Silva) v. DPP [2006] EWHC (Admin) 3204 [20] (Eng. and Wales).

[108] See Victims' Right to Review Data, CPS, *http://www.cps.gov.uk/victims_* witnesses/victims_right_to_review/vrr_data/index.html (last updated June 2017) (noting that 6.8% of appeals (137 out of 1988) succeeded in 2016-17; thirteen percent of appeals (210 out of 1674) succeeded in 2014-15). The percentage of prosecution decisions challenged in this way has been well below one percent - 0.13% in 2016-17, and 0.17% in 2014-15 - which suggests the administrative burden is manageable. See id.

[109] See Balderstone v. R (1983), 23 Man. R. (2d) 125, at para. 28 (Can. Man. C.A.) ("If a judge should attempt to review the actions or conduct of the Attorney-General - barring flagrant impropriety - he could be falling into a field which is not his and interfering with the administrative and accusatorial function of the Attorney-General or his officers. That a judge must not do.").

[110] Decisions to discontinue a prosecution after charging get similar scrutiny. For an example of a court finding wrongful a decision to discontinue prosecution, see R (FB) v. DPP [2009] EWHC (Admin.) 106, [2009] Crim. App. 38, at P 70 (Eng. and Wales). On prosecutor's nolle pros authority, see R v. B(F) [2010] EWCA (Crim.) 1857, [2010] 2 Crim. App. 35, at P13 (Eng.); R (Gujra) v. CPS [2013] AC 484, at 484 (Eng. and Wales). See also R v. DPP [1995] (QB) 1 Crim. App. 136, at 145 (Eng.).

[111] For leading decisions on the issue, see R v. DPP [2001] QB 330, at 344-48 (Eng. and Wales); R (Da Silva) v. DPP [2006] EWHC (Admin) 3204 [24] (Eng. and Wales); Sharma v. Brown-Antoine [2006] UKPC 57, [2007] 1 WLR 780, at 792-96 (appeal taken from Trin. And Tobogo); Marshall v. DPP [2007] UKPC 4 (appeal taken from Jam.); R v. Metropolitan Police Commr. [1968] 2 QB 118, at 119-20 (Eng.); R v. DPP (Kebiline) [2000] 2 AC 326, at P 2 (Eng.). England created its prosecution agency, the Crown Prosecution Service, only in 1985. See Prosecution Offences Act 1985, c. 23, § 1 (Eng. and Wales); Andrew Ashworth & Mike Redmayne, The Criminal Process 222-23 (4th ed. 2010). The Director of Public Prosecutions was created in 1879 but did not handle most prosecutions until the creation of the Crown Prosecution Service. In the intervening century, police came to dominate filing of criminal charges, supplemented by private prosecutions, a system that eventually was viewed as providing insufficient supervision of charging decisions by police. See Williams, supra note 78.

But that distinction has an upside: private prosecution and judicial review do not work in cases in which there is no direct victim - or in which private parties do not realize they have been victimized, as in some cases of large-scale corporate or government fraud, or in some cases of child pornography. [147] Federal prosecutors, however, take on just such cases as a core part of their enforcement agenda. [148] On the other hand, federal oversight is limited in other important respects: federal criminal enforcement authority is not fully coextensive with state criminal law; notably, for example, it provides effectively no enforcement redundancy for ordinary domestic violence, rape, and other sexual assault offenses. [149]

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B. Three Kinds of Offenses: Corruption, Police Violence, Sexual Assault

Consider the efficacy for these oversight options with respect three types of offenses: local fraud or corruption, excessive use of force and other wrongdoing by local law enforcement officers, and sexual assaults. These three classes of offenses have in common that they have proven to be especially vulnerable to underenforcement. At the same time, the differences in how U.S. criminal justice institutions have responded to underenforcement in each area highlight the efficacy and limits of the federalism-based enforcement redundancy compared to the alternatives - both those U.S. jurisdictions reject (private prosecution and judicial review) and a fourth, unique strategy they embrace: politically accountable prosecutors.

1. Public Corruption

Corrupt conduct by government officials is a category of wrongdoing especially likely to suffer from underenforcement, for obvious reasons: we depend on one set of public officials, prosecutors and investigative agents, to stop wrongdoing by other public officials - as well as by colleagues within their own ranks. Professional and even personal relationships often exist between these groups of public officials. Even when the boundaries between lawful and unlawful conduct are clear and law

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[112] R (Da Silva) v. DPP [2006] EWHC (Admin) 3204 [24] (Eng. and Wales) (summarizing three grounds for review and citing R v. DPP [1995] (QB) 1 Crim. App. 136 (Eng.)); R (Guest) v. DPP [2009] EWHC (Admin.) 594, [2009] 2 Crim. App. 26, at P 34 (Eng. and Wales); R v. General Council of the Bar [1990] 3 All ER 137 (QB), at 137-38 (Eng. and Wales). For an overview, see Ashworth & Redmayne, supra note 111; Christopher Hilson, Discretion to Prosecute and Judicial Review, Crim. L. Rev. 739 (1993) (examining case law regarding prosecution decisions and subsequent judicial review); Appeals: Judicial Review of Prosecutorial Decisions, CPS, *https://www.cps.gov.uk/legal-guidance/appeals* -judicial-review-prosecutorial-decisions (last updated May 21, 2009). The European Convention on Human Rights may impose affirmative obligations on member states that certain instances require prosecutions, or that more generally require a state to maintain a criminal justice system that provides sufficient protection to citizens. English courts found that their established standards of review of noncharging decisions, based in domestic law, have been held sufficient to meet any such obligation. See R (FB) v. DPP [2009] EWHC (Admin.) 106,[2009] Crim. App. 38, at P 64 (Eng. and Wales) (discussing state obligations under Articles 2 and 3); see also R v. Killick [2011] EWCA (Crim.) 1608, [2012] 1 Crim. App. 10 at [48] (confirming victims' right to review). Judges may require disclosure of internal prosecution documents, but they assess the lawfulness of nonprosecution without examining the underlying evidence. See R (Da Silva) v. DPP [2006] EWHC (Admin) 3204 [24] (Eng. and Wales) (noting use of redacted investigative report and case notes from CPS but disavowing evaluation of evidence).

[113] See R v. DPP [2001] QB 330 at 337 (Eng. and Wales); R v. Metro. Police Commr. [1958] 2 QB 118, at 123-25 (Eng. and Wales); Ashworth & Redmayne, supra note 111, at 221-22. Decisions by U.S. courts give no special solicitude to instances of nonprosecution in the wake of injuries or deaths caused by prison guards or other law enforcement officials. See, e.g., *Leeke v. Timmerman, 454 U.S. 84, 85-87 (1981)* (rejecting state prison inmates' federal civil claim alleging bad faith by state officials to block issuance of arrest warrants against guards on allegations of unnecessary beatings during prison uprising); *Inmates of Attica Corr. Facility v. Rockefeller, 477 F.2d 375, 382-83 (2d Cir. 1973)* (rejecting request, on behalf of inmates injured or killed by state prison guards in the wake of a prison riot, that federal courts compel state and federal prosecutors to charge guards, reaffirming that prosecutorial discretion is immune to judicial review). To facilitate review, English prosecutors in some circumstances must provide public reasons for choosing not to file charges. See Jordan v. United Kingdom (No. 2) [2003] 37 Eur. Ct. H.R. 52 PP 82-86, 122-23, 142-45 (holding that under article 2 of the European Convention on Human Rights prosecutors should give reasons explaining a decision not to bring criminal charges after an investigation into a death caused by police shootings); see also R v. DPP [2001] QB 330, at 347 (Lord Bingham, CJ) (Eng. and Wales) ("In the absence of compelling grounds for not giving reasons, we would expect the Director to give reasons in such a case [of non-prosecution]: to meet the reasonable expectation of interested parties that either a prosecution will follow or a reasonable explanation for not prosecuting be given … ."); EU Council Directive 2012/29, supra note 100, art. 6, at 67 (requiring explanations to victims that can be subjected to review). Irish victim rights laws that took effect in 2015 now require prosecutors to provide reasons to victims for declining to prosecute. See Mark Hilliard, New Laws on Rights of

enforcement can learn of misconduct done mostly in secret, political or personal incentives for enforcement officials that discourage zealous enforcement can exist for enforcement officials in the same jurisdiction - perhaps enmeshed in the same political networks. In short, underenforcement in this realm follows more from favoritism toward offenders than the biases against victim groups or types of offenses.

"Corruption" is a notoriously hard concept to define, [150] but that difficulty is actually somewhat useful for present purposes. Some of what constitutes public corruption is relatively clearly **[*892]** defined in positive law. Easy cases involve straightforward property theft or embezzlement, quid pro quo bribery, and extortion. [151] Statutes also make clear at least some cases of illegal gratuities and breaches of regulations that govern activities such as campaign finance. [152] More ambiguous or marginal cases of alleged corruption, however, illustrate the federal government's ambitious commitment to enforcing broad interpretations of federal anti-corruption laws to conduct of state and local officials. That enforcement track record demonstrates the strong commitment to enforcement redundancy in this area.

States have their own regulatory strategies to address government corruption, although independent assessments do not judge them to be particularly successful. [153] The federal government seems to share that view. The Justice Department created a Public Integrity Section within the Criminal Division in 1976, [154] and in the four decades since, federal prosecutors have **[*893]** aggressively prosecuted conduct of state and local officials that it determines breaches federal anti-corruption statutes. [155] For the past two decades, federal anti-corruption prosecutions of state and local officials typically average 350-400 per year. [156] Combatting "public corruption" is a top priority for the Federal Bureau of Investigation, on par with combating threats of terrorism, foreign espionage, and cyber-warfare. [157] And many of these prosecutions targeted wrongdoing far removed from property theft or quid pro quo bribery. [158] They extend to conduct involving undue influence, breaches of fiduciary duty, or failure to provide citizens with "honest services" [159] - wrongdoing for which the public harm is sometimes hard to identify. [160]

[*894] By some accounts, including the U.S. Supreme Court's on occasion, [161] this enforcement agenda has been overly aggressive. [162] But Congress has generally encouraged far-reaching federal enforcement, notably by expanding the scope of federal anti-corruption law in response to narrow judicial interpretation. [163] And the key point here is that the federal executive

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Crime Victims are Criticized, Irish Times (Nov. 16, 2015), *http://www.irishtimes.com/news/crime-and-law/new-laws-on-rights-of* -crime-victims-are-criticised-1.2431095. By contrast, see*Singer v. United States, 380 U.S. 24, 34-37 (1965)* (holding that due to judicial "confidence in the integrity of the federal prosecutor," U.S. attorneys need not give reasons for refusing to consent to defendant's waiver of jury trial). For rare examples of U.S. rules requiring prosecutors to give reasons for not charging, see *Colo. Rev. Stat. § 16-5-209* (2014) (requiring prosecutor's reasons upon private complaint objecting to non-prosecution); Pa. R. Crim. P. 506.

[114] Review within the U.S. Justice Department hierarchy is mandated by *18 U.S.C. § 3771*(f) (2016); see also id. § 3771(f)(2)(D) (protecting Justice Department decisions from judicial review).

[115] See *18 U.S.C. § 3771*(a)(5).

[116] The Availability of Crime Victims' Rights Under the Crime Victims' Rights Act of 2004, *35 Op. O.L.C. 8 (2010).* For a vigorous argument against the OLC position, see Paul Cassell et al., Crime Victims' Rights During Criminal Investigations? Applying the Crime Victims' Rights Act Before Criminal Charges Are Filed, *104 J. Crim. L. & Criminology 59, 61-63 (2014)* (arguing for victims' right to confer and that the right to fair treatment extends to pre-charging stage).

[117] *Doe v. United States, 950 F. Supp. 2d 1262, 1267-68 (S.D. Fla. 2013)* (re-opening and setting aside a pre-charge non-prosecution agreement between prosecutors and defense because prosecutor had not consulted with victim in violation of *18 U.S.C. § 3771).*

[118] See *In re Dean, 527 F.3d 391, 395 (5th Cir. 2008)* (acknowledging lower court's interpretation of § 3771(a) before any prosecution is underway); *Does v. United States, 817 F. Supp. 2d 1337, 1342-45 (S.D. Fla. 2011)* (recognizing that *18 U.S.C. § 3771*(a) can apply before formal charges are filed); *Jordan v. Dep't of Justice, 173 F. Supp. 3d 44, 52 (S.D.N.Y. 2016)* (citing *In re Dean, 527 F.3d at 395);* United States v. BP Prod. N. Am., Inc., No. H-07-434, 2008 WL 501321, at 11 (S.D. Tex. Feb. 21, 2008) (discussing *18 U.S.C. § 3771* and a broad duty to confer before charges are filed). Another district court refused prosecutors' request to dismiss charges before the prosecutor consulted the victim. *United States v. Heaton 458 F. Supp. 2d 1271, 1272 (D. Utah 2006)* (citing victim's right under *18 U.S.C. § 3771*(a)(8) "to be treated with fairness and with respect for [her] dignity and privacy").

branch is firmly committed to a robust enforcement policy against local government corruption that is also criminalized under state law, and Congress has supported this agenda by enacting federal crimes intended to duplicate, or greatly overlap, state offenses. [164] In fact, federal statutes used in anti-corruption cases - **[*895]** like other federal criminal statutes - rely on and incorporate state law in federal offense definitions. In light of this structure, federal prosecutions can claim to effectuate state law goals - an especially straightforward version of federalism-based enforcement redundancy. [165]

2. Sexual Assault

In sharp contrast to public corruption, enforcement redundancy through coextensive jurisdiction is largely nonexistent for a large portion of the serious crimes that dominate state felony dockets, including sexual assaults, domestic violence, and homicide. [166] Federal law reaches only a small number of these offenses when they intersect a special basis for federal jurisdiction, such as interstate conduct - like human trafficking - or wrongs that occur on federal property or involve federal employees. [167] For most kinds of homicides, the lack of redundancy is only a modest hindrance to adequate enforcement; holding aside distinctive exceptions - such as homicides by police or racially motivated lynchings - there is little evidence to suggest patterns of homicide underenforcement in state justice systems. [168] Domestic violence and sexual assaults are a different story. Like local public corruption, sexual assaults have long been a key example of **[*896]** serious wrongdoing to which the responses of state and local criminal justice agencies have been deeply problematic. [169]

Underenforcement is hard to measure for sexual assaults as it is in other contexts, but central features of the problem are clear enough. Rape and other forms of sexual assault are dramatically underreported crimes. [170] The leading government effort to collect data on sexual assaults (and other crimes), the National Crime Victimization Survey, is widely thought to undercount incidents of those offenses. [171] And rates of victim reports to police departments are even lower. The FBI Uniform Crime Reports collects data on sexual assaults reported to local police agencies; the number is consistently well below the annual number reported in the National Crime Victimization Survey. [172]

One reason that victims do not to report rapes to law enforcement is the perception that police and prosecutors (as well as juries) are unduly skeptical of rape allegations. [173] And there is good evidence that law enforcement agencies' responses to

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[119] See In re Petersen, No. 2:10-CV-298 RM, 2010 WL 5108692, at 2 (N.D. Ind. Dec. 8, 2010) (concluding that prosecutors control charging decisions and certain victim rights under *18 U.S.C. § 3771*(a), including the right ""to confer with the attorney for the Government in the case,' ... arise only after charges have been brought against a defendant and a case has been opened," although a "victim's "right to be treated with fairness and with respect for [his or her] dignity and privacy,' ... may apply before any prosecution is underway" (quoting *18 U.S.C. § 3771*(a))); cf. *United States v. Rubin, 558 F. Supp. 2d 411, 419 (E.D.N.Y. 2008)* (assuming without deciding that some federal victim rights may apply before any prosecution is under way, but "cannot be read to include the victims of uncharged crimes that the government has not even contemplated ... [or] has not verified to at least an elementary degree").

[120] Many state laws grant victims a right to consult only "after the crime against the victim has been charged" or "regarding the charges filed." Others create only a general right to confer, or "to communicate," "with the prosecution." E.g., Alaska Const. art. I, § 24 (granting "the right to confer with the prosecution"); Ariz. Const. art. 2, § 2.1(A)(6) (granting the right to "confer with the prosecution, after the crime against the victim has been charged, before trial or before any disposition of the case and to be informed of the disposition"); Cal. Const. art. I, § 28(b)(6) (granting the right to "reasonably confer with the prosecuting agency, upon request, regarding ... the charges filed ... ."); Idaho Const. art. I, § 22(5) (granting the right to "communicate with the prosecution"); Ill. Const. art. I, § 8.1(a)(4) (granting the right to "communicate with the prosecution"); Ind. Const. art. I, § 13(b) (amended 1996) (granting the right to "confer with the prosecution"); La. Const. art. I, § 25 (granting the "right to confer with the prosecution prior to final disposition of the case"); Mich. Const. art. I, § 24(1) (granting the "right to confer with the prosecution"); N.M. Const. art. 2, § 24(A)(6) (granting the "right to confer with the prosecution"); N.C. Const. art. I, § 37(1)(h) (granting the "right as prescribed by law to confer with the prosecution"); Or. Const. art. I, § 42(1)(f) (granting the "right to be consulted, upon request, regarding plea negotiations involving any violent felony"); S.C. Const. art. I, § 24(A)(7) (granting the right to "confer with the prosecution, after the crime against the victim has been charged, before the trial or before any disposition and informed of the disposition"); Tenn. Const. art. I, § 35(a) (granting the "right to confer with the prosecution"); Tex. Const. art. I, § 30(b)(3) (granting the "right to confer with a representative of the prosecutor's office"); Va. Const. art. I, § 8-A(7) (granting the "right to confer with the prosecution"); Wis. Const. art. I, § 9m (granting an "opportunity to confer with the prosecution"); *Del. Code Ann. tit. 11, § 9405* (2018); *Ga. Code Ann. § 17-17-11* (2018); *Haw. Rev. Stat. § 801D-4(a)(1)* (2017) (granting the right of victim to be informed of the final disposition of the case); *Neb. Rev. Stat. 29-120* (2017) (requiring the prosecution to make a good faith effort to consult with victim); N.Y. Exec. Law § 642(1) (LexisNexis 2018) (providing standards for fair treatment of victims); *Ohio Rev. Code Ann. § 2930.06(A)* (LexisNexis 2018) (stating

sexual assault reports are ineffective. Police clearance-by-arrest rates are low. [174] Detailed studies of how police departments handle reported sexual assault cases find "substantial attrition," **[*897]** typically at the point when police decide whether to make an arrest. [175] In the Los Angeles Police Department, only one report in nine was cleared by arrest; one in ten resulted in prosecution. [176] One hurdle lies in forensic evidence development: law enforcement agencies nationwide have suffered long backlogs in testing rape evidence kits, [177] although federal funding has recently helped reduce that problem. [178]

Notoriously, things used to be much worse. Under the common law definition, rape convictions required proof that the offender used force to overcome the victim's "utmost resistance." [179] Evidence of women's - and only women's - prior sexual conduct or reputation for "unchastity" was a permissible basis on which to infer consent. [180] The law excluded rape of one's spouse from **[*898]** the offense definition. [181] Prosecutors and police were openly skeptical of rape accusations and reluctant to investigate. [182]

Yet much of this legal infrastructure intended to restrict rape law enforcement has been abolished. Rape offenses have been revised to eliminate resistance requirements, and many states also removed the requirement to prove use of force. [183] Evidence rules are now more favorable to sexual assault complainants: rape shield laws in all jurisdictions prohibit use of a complainant's past sexual behavior as character evidence or a basis on which to infer consent, [184] while evidence rules in federal courts and nineteen states permit evidence of the defendant's past sexual offenses to show propensity to commit sexual assaults. [185] Some police departments have officers specially trained in sexual assault investigations, and prosecutors' offices (as required by statute in some states) have specially trained units dedicated to sexual assault prosecutions. [186] Hospitals and **[*899]** social service agencies likewise now have staff trained in forensic interviewing and evidence-gathering in the course of aiding assault victims. [187]

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that the "prosecutor … shall confer with the victim in the case before pretrial diversion is granted … [or] before amending or dismissing a charge").

[121] No rights of administrative review are specified in the state victims' rights laws cited supra note 120.

[122] Five states place all their prosecutors within a single state agency, which at least potentially makes possible hierarchical oversight. In New Jersey, Connecticut, Rhode Island, Delaware, and Alaska, local prosecutors are appointed by, and under the supervision of, the state attorney general. See Steven W. Perry, Bureau of Justice Statistics, U.S. Dep't of Justice, Prosecutors in State Courts, 2005, at 2 (2006), *https://www.bjs.gov/content/pub/pdf/psc05.pdf* (noting Alaska, Connecticut, and New Jersey do not elect prosecutors; Delaware and Rhode Island elect attorneys general who appoint all prosecutors; all other states elect prosecutors at the local level). Id. at 11. For an example of a state attorney general's limited authority over locally elected prosecutors, see, for example,*Va. Code § 2.2-511* (2018).

[123] Equal protection and due process doctrines nominally empower courts to review charging decisions motivated by racial bias or retaliation for exercising fundamental rights, and inquiry into selective charging implicitly requires examining biased declinations as well. But these doctrines are wholly deferential to prosecutorial discretion. See *United States v. Armstrong, 517 U.S. 456, 469 (1996)* (holding that equal protection doctrine bars racially biased charging); *Wayte v. United States, 470 U.S. 598, 607-08 (1985)* (holding that due process bars charging in retaliation for exercising fundamental rights); see also *McCleskey v. Kemp, 481 U.S. 279, 312-314 (1987)* (holding that statistical evidence of bias in death penalty administration insufficient to prove constitutional violation without proving purposeful discrimination in defendant's case). For a classic account, see Kenneth Culp Davis, Discretionary Justice: A Preliminary Inquiry 188, 207-08 (1969) ("The affirmative power to prosecute is enormous, but the negative power to withhold prosecution may be even greater, because it is less protected against abuse… . The plain fact is that nine-tenths of local prosecutors' decisions are supervised or reviewed by no one.").

This basic overview - drawn from a substantial scholarly literature - paints a somewhat contradictory picture. On the one hand, the primary story is one of longstanding underenforcement - a combination of explicit legal policies, practical evidence-gathering and proof challenges, and cultural biases resulted in a notoriously weak response to sexual assaults by state criminal justice systems. On the other hand, there is a story, over the last forty years or so, of wide-ranging success in achieving reforms on several fronts - substantive and procedural law, institutional design, and resource allocation - designed to improve enforcement capacity. In other words, U.S. jurisdictions made substantial progress against an ingrained tradition of underenforcement without turning to any model of enforcement redundancy - federalization, private prosecution, or judicial review. That is more than state justice systems were ever able to do with regard to local government corruption, where the remedy instead was the rise of federal criminal law enforcement.

And yet, few seem to consider this reform story a success. [188] The data on underreporting by victims, low arrest rates by police, and charging rates by prosecutors (along with the rape kit **[*900]** testing backlog) make it easy to view state criminal justice systems as failing to achieve adequate enforcement responses to sexual assaults despite the scope and gravity of the problem - 124,000 offenses reported to police in 2015, and 431,000 assault reports estimated by the National Crime Victim Survey. [189]

This story of reform, its decidedly limited success, and the responses to that record all reveal insights about the prospects for redressing underenforcement through redundancy in this context. Intersecting feminist, victim rights, and rape-law-reform movements have achieved some remarkable reforms through the political process over the last four decades. U.S. criminal justice, like U.S. public law generally, is responsive to popular sentiment, well-organized reform movements, and interest groups. [190] But these movements never sought any mechanism of enforcement redundancy, and federal and state lawmakers never seriously considered one. Even now, when offense definitions, victim rights, evidentiary rules, and organizational changes in law enforcement agencies offer few plausible options for further improvement, there is effectively no sign of interest in private prosecution and judicial or administrative oversight. Instead, the sole focus of further innovation to address endemic underenforcement of sexual assault offenses is the federal government. And most federal policy - and policy proposals - stop short of expanding federal law to cover sexual assaults now within the jurisdiction solely of state courts. [191] A notable

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[124] *Linda R.S. v. Richard D., 410 U.S. 614, 619 (1973)* (rejecting private plaintiff's challenge on federal equal protection grounds to state policy of prosecuting only married men for failures to pay child support, concluding "in American jurisprudence at least, a private citizen lacks a judicially cognizable interest in the prosecution or nonprosecution of another"); *Leeke v. Timmerman, 454 U.S. 83, 84 (1981)* (extending Linda R.S. to hold that private citizens have "no cognizable interest" in process by which magistrates decide whether to issue warrants on criminal complaints); cf. *Inmates of Attica Corr. Facility v. Rockefeller, 477 F.2d 375, 382-83 (2d Cir. 1973)* (rejecting purported crime victims' request that court order prosecutors to charge).

[125] See, e.g., *Colo. Rev. Stat. § 16-5-209* (2017) ("The judge of a court having jurisdiction of the alleged offense, upon affidavit filed with the judge alleging the commission of a crime and the unjustified refusal of the prosecuting attorney to prosecute any person for the crime, may require the prosecuting attorney to appear before the judge and explain the refusal. If … the judge finds that the refusal of the prosecuting attorney to prosecute was arbitrary or capricious and without reasonable excuse, the judge may order the prosecuting attorney to file an information and prosecute the case or may appoint a special prosecutor to do so."); *Mich. Comp. Laws § 767.41* (2017) ("If, upon examination, the court is not satisfied with the [prosecution's] statement, the prosecuting attorney shall be directed by the court to file the proper information and bring the case to trial."); *Neb. Rev. Stat. § 29-1606* (2017) ("If, upon such examination, the court shall not be satisfied with the [prosecution's] statement, the county attorney shall be directed by the court to file the proper information and bring the case to trial."); Pa. R. Crim. P. 506(B)(2) (requiring prosecutors to give reasons for declining to prosecute a criminal complaint filed by a private party, and permitting "the affiant [to] petition the court of common pleas for review of the decision"); *In re Hickson, 2000 PA Super 402, PP 12-19* (describing victim standing to seek judicial review of decisions not to prosecute based on private complaints); see also ***State ex rel. Clyde v. Lauder, 90 N.W. 564, 569 (N.D. 1902)*** ("The more modern rule, and that adopted in this state, is the reverse of that at common law. In this state, while the prosecutor may file with the court his reasons for not filing an information … it is the province of the court to determine the ultimate question whether the case shall be prosecuted or dismissed."); cf. *Olsen v. Koppy, 593 N.W.2d 762, 765-67 (N.D. 1999)* (citing ***Lauder, 90 N.W. 564,*** with approval).

[126] See *Cal. Penal Code § 1385* (West 2016) ("The judge or magistrate may, either of his or her own motion or upon the application of the prosecuting attorney, and in the furtherance of justice, order an action to be dismissed."); Darryl K. Brown, Free Market Criminal Justice 35-37 (2016); Valena E. Beety, Judicial Dismissals in the Interest of Justice, *80 Mo. L. Rev. 629, 640-43 (2015)* (advocating for a shift in court-reviewed dismissals).

exception is Professor Donald Dripps's current proposal to expand federal criminal law to cover most sexual assault offenses - precisely the model of federal-state enforcement redundancy that **[*901]** exists now for drug crimes, corruption, police violence, and much else. [192] But otherwise, existing policies and reform proposals emphasize more modest, although meaningful, federal efforts to improve state justice administration through, for example, funding grants (as for rape kit testing) [193] and occasionally by litigation to force institutional reforms in local agencies.

In fact, federal law empowers the U.S. Justice Department to sue local police departments and other agencies, and authorizes structural injunctions to remedy systemic misconduct. [194] But the Department's use of this authority has largely focused on police violence rather than sexual assault underenforcement. [195] Various local law enforcement agencies have entered consent decrees under which they adopt institutional and policy reforms to reduce patterns of misconduct, even though federal intervention is hampered by the paucity of data on police misconduct, limited federal resources, and at times the political commitment of the presidential administration. [196] More to the point here, in only a few cases have federal officials targeted local agencies' inadequate responses to sexual assault. [197]

In sum, and in sharp contrast to public corruption, the problem of underenforcement in the sexual assault context reveals the resistance, and cost, of U.S. criminal justice to institutional structures of enforcement redundancy. Having ruled out judicial review and private prosecution from the imaginations of reform-movement activists, the only alternative is the one that U.S. criminal justice always favors - federalism. Where federal criminal law takes on an enforcement agenda, it is usually effective. [198] Where tradition, politics, jurisdictional limits, or policy **[*902]** choices restrict the reach of federal law, as with sexual assault, the U.S. justice system is largely out of options. States were willing to change substantive and procedural law in hopes of improving rape prosecutions, but not to infringe prosecutors' monopoly control of charging by expanding modes of judicial, administrative, or private-party oversight.

3. Police Violence

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[127] New York granted courts nolle prosequi authority in 1829, during its era of private and judicially appointed prosecutors. McConville & Mirsky, supra note 81, at 35 (citing 1829 N.Y. Rev. Stat. tit. IV, § 68, p.730 & § 54. p.726). For a broad overview of state nolle pros laws, see Annotation, Power of Court to Enter Nolle Prosequi or Dismiss Prosecution, 69 A.L.R. 240 (1930). The federal rule is *Fed. R. Crim. P. 48(a)*. Note that these rules give judges implicit power to compel prosecutors to litigate charges they would rather dismiss. For decisions insisting on judicial deference, see, for example, Genesee *Prosecutor v. Genesee Circuit Judge, 215 N.W.2d 145, 147-48 (Mich. 1974).* For similar examples in federal cases, see *United States v. Smith, 55 F.3d 157, 159-60 (4th Cir. 1995); United States v. Perate, 719 F.2d 706, 710-11 (4th Cir. 1983); United States v. Smith, 853 F. Supp. 179, 183-84 (M.D.N.C. 1994); Dawsey v. Gov't of Virgin Islands, 931 F. Supp. 397, 402-04 (D.V.I. 1996).* A standard explanation for deference is that judges lack means to compel prosecutors to litigate charges at trial. See, e.g., *United States v. Greater Blouse, Skirt & Neckwear Contractors Ass'n, 228 F. Supp. 483, 489-90 (S.D.N.Y. 1964)* ("Even were leave of Court to the dismissal of the indictment denied, the Attorney General would still have the right to … , in the exercise of his discretion, decline to move the case for trial. The Court in that circumstance would be without power to issue a mandamus or other order to compel prosecution of the indictment, since such a direction would invade the traditional separation of powers doctrine."). But judges have options short of mandamus. Presumably they could hold prosecutors in contempt for failures to appear, as they could for all other attorneys. And whenever prosecutors retain an interest charges they seek to dismiss, judges could incentivize them by ruling that failure to litigate charges results (as for civil parties) in forfeiture of the claim, or dismissal with prejudice.

[128] For an overview of Canadian law on this point, see Mark Phillips, The Public Interest Criterion in Prosecutorial Discretion: A Lingering Source of Flexibility in the Canadian Criminal Process?, 36 Windsor Rev. Legal & Soc. Issues 43 (2015) (describing case law requiring great judicial deference to prosecutorial discretion). For Australia cases on prosecutorial discretion, see Miller v Commonwealth Dir. of Pub. Prosecutions [2005] 142 FCR 394, 399-400 (Austl.).

[129] Manikis, supra note 60, at 29. In addition, many nineteenth-century state courts justified privately funded prosecutions by citing the public value of these contributions to supplement underfunded district attorney offices. See Ireland, supra note 83, at 47, 49-51 (citing and quoting multiple state courts). Private prosecutors may have different reasons to proceed when despite comparatively low odds of winning a conviction. Some of those motivations, at least, can be public-regarding. Avlana Eisenberg makes the point that prosecuting hate crimes cases, for example, can have expressive and educative value that justifies pursuing well-grounded cases despite skeptical juries. Eisenberg, supra note 45, at 893-95, 902-18.

[130] For discussions on the common law aversion to private prosecution, see Ireland, supra note 83 and for a review of the impact of racial tensions on private prosecution, see Blackmon, supra note 98.

Responses to unjustified police violence reveal a third outcome for enforcement redundancy confined to the federalism model. Federal enforcement authority extends to cases of police violence to a much greater degree than for sexual assaults. That authority extends as well to other kinds of bias-motivated wrongdoing by both private actors and government officials, which local police and prosecutors have at times ignored or devalued, and for which state-level enforcement commitment continues to be uneven. [199] Federal jurisdiction is coextensive with state jurisdiction regarding police wrongdoing, and the Justice Department's institutional capacity for enforcement probably exceeds that of its state counterparts, but in one respect the overlap is not complete. The key substantive criminal offenses available to prosecutors in the federal code are somewhat more restrictive. The primary federal statute used to charge cases of **[*903]** police excessive use of force requires proof of willful deprivation of rights, [200] a strict mens rea standard that makes it harder for federal prosecutors to prove liability than it would be for state prosecutors relying on typical assault or homicide offense definitions. [201] The fact that Congress has for decades let stand this mens rea hurdle to excessive-force prosecutions suggests that federal legislators, if not Justice Department officials, are less committed to a full federal-state enforcement redundancy - or "to altering the federal-state balance in order to reinforce state law enforcement" - than they are for public corruption offenses. [202]

That limit notwithstanding, federal prosecutions in this area have a track record of succeeding where state prosecutions failed or were never attempted, and in that way providing at least a partial remedy for underenforcement by state criminal justice officials. Much of the federal advantage comes from the fact that federal prosecutors are, in general, better situated to objectively investigate, assess, and prosecute wrongdoing by police officers than are local prosecutors who ordinarily interact with and depend upon those officers (or at least their agencies). This is not a particular criticism of local prosecutors' offices; it is one instance of the basic problem that officials (and people generally) are untrustworthy judges of the conduct of others with whom they have affiliations, allegiances, or ongoing relationships. For that reason a few states assign such cases to state-level, rather than local, officials. [203] And the U.S. Justice Department attempts to collect data on deaths in jails, prison, or during **[*904]** attempted arrests, to facilitate Justice Department oversight. [204] The same concerns motivate English laws applying special judicial scrutiny (when triggered by requests from victims' families) to prosecutor's decisions not to charge in the case of death caused by law enforcement officials or occurring in official custody. [205]

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[131] Some federal states such as Germany and Canada lack enforcement redundancy because they use a single, nationwide, criminal code, which is enforced for prosecution agencies and courts organized at the state or provincial level. See generally Eric P. Polten & Eric Glezl, Federalism in Canada and Germany: Overview and Comparison (2014) (describing similarities in German and Canadian federalism, including allocating authority over substantive criminal law to the federal government but criminal justice administration to state or provincial prosecutors and courts). In Australia, like in the United States, states and the federal government each have their own criminal codes. But Australian federal criminal authority is confined much more narrowly than in the United States to conduct that implicates a distinct federal interest. See generally Arther B. Gunlicks, The Lander and German Federalism 59, 72, 129 (2003) (describing German criminal affairs and jurisdictions as compared to the United States); Polten & Glezl, supra, at 5-6, 10, 13-14; Brian Galligan, Comparative Federalism, in The Oxford Handbook of Political Institutions 261, 266-75 (Sarah A. Binder et al. eds., 2008) (discussing federalism and judicial review and regulations); Kathleen Daly & Rick Sarre, Criminal Justice System: Aims and Processes, in Crime and Justice: A Guide to Criminology 357 (Darren Palmer et al. eds., 5th ed. 2017) (examining the processes and purposes of the criminal justice system); Vicki Waye & Paul Marcus, Australia and the United States: Two Common Criminal Justice Systems Uncommonly at Odds, Part 2, *18 Tul. J. Int'l & Comp. L. 335 (2010)* (highlighting similarities and differences between the two countries in relation to criminal laws and policies).

[132] Since 2011, Switzerland also now has unified national criminal law and procedure codes administered in all cantons. See Anna Petrig, The Expansion of Swiss Criminal Jurisdiction in Light of International Law, 9 Utrecht L. Rev. 34, 36 (2013).

[133] See Director of Public Prosecutions Act 1983 s 10(2); Annual Report 2014-15, supra note 71.

[134] In unusual circumstances, two states may also have concurrent jurisdiction over the same crime, enabling one to assess the adequacy of the other's enforcement effort. For a rare example, see *Heath v. Alabama, 474 U.S. 82, 91-93 (1985).*

[135] See ***U.S. Const. amend. V*** (Double Jeopardy Clause); *Bartkus v. Illinois, 359 U.S. 121, 136-39 (1959)* (affirming power of state to prosecute defendant after a federal prosecution for the same bank robbery); *United States v. Lanza, 260 U.S. 377, 384-85 (1922)* (approving federal prosecution after state prosecution based on same conduct).

U.S. victims lack a right to challenge noncharging decisions in cases of homicides by police. But they, along with organized interest groups, can lobby prosecutors to prosecute. In some cities, voters and activist groups have pressured local prosecutors on police violence cases. [206] It is difficult to assess what role public sentiment plays (and should play) in charging decisions. But it is not hard to find instances of potent political challenges to non-prosecution of police officers in the wake of fatal shootings. Chief prosecutors in Cleveland, Ohio, and Chicago, Illinois, lost reelection bids in the wake controversial failures to charge police officers in fatal-shooting cases. [207] In the midst of popular and activist attention on such cases, prosecutors in several other cities have charged officers for offenses related to suspects' deaths, with mixed records of success. [208] Chicago prosecutors did so a year **[*905]** after police fatally shot a suspect and only upon public release of video of the incident [209] - a scenario that suggests public attention corrected a noncharging decision influenced by improper considerations.

However, U.S. localities vary widely in their demographics, politics, and community sentiments toward these cases. [210] That variation, plus local election of prosecutors, contributes to widely varying enforcement policies across prosecution offices. [211] And it means victims who urge prosecutions when local majority sentiment disfavors it have lower odds of successfully influencing **[*906]** prosecutors. The political variability of local prosecutors' charging policies - and the vulnerability of those decisions to local sentiment that favors unjustified underenforcement - are a key reason federal redundancy is important in this context. Given that police misconduct is an established part of the U.S. Justice Department's enforcement agenda, federal prosecutors should be a check on political judgments of local prosecutors. They also provide victims with a different agency to appeal to for investigation and prosecution.

This federalism-based model of redundant enforcement has advantages as a strategy to reduce risks of unmerited underenforcement. The alternative model authorizing judicial review of declination decisions, as is used in England, relies on the independence of judges from the prosecutors whom they review. [212] The federalism model relies on the independence of federal prosecutors from state prosecutors and police. The executive branch of one sovereign scrutinizes the enforcement response of another. And it has the capacity to act on its independent judgment, while courts are confined to ordering

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[136] See *United States v. Gamble, 694 Fed. App'x. 750 (11th Cir. 2017),* cert. granted, ***Gamble v. United States, 138 S. Ct. 2707 (2018).*** Even if the Court abolishes the dual sovereignty doctrine in Gamble, federal and state prosecutors will continue to be able to prosecute the same offenders for the same conduct in many cases. Under *Blockburger v. United States, 284 U.S. 299, 304 (1932),* the Double Jeopardy Clause precludes multiple prosecutions only if the subsequent charge has the "same elements" as the first. See *United States v. Dixon, 509 U.S. 688, 696 (1993)* (affirming Blockburger's same-elements test as the sole basis for double jeopardy claims). Unlike the firearm offenses that gave rise to Gamble's Double Jeopardy claim, federal and state crimes covering the same conduct often have distinct elements. For an example, see infra notes 200-02 and accompanying text.

[137] See, e.g., U.S. Dep't of Justice, United States Attorneys' Manual, supra note 55, § 9-2.031 (explaining the "Petite policy" criteria for federal prosecution of same conduct after state prosecution).

[138] For an example of a high-profile federal declination in the wake of state declination, see U.S. Dep't of Justice, Department of Justice Report Regarding the Criminal Investigation Into the Shooting Death of Michael Brown by Ferguson, Missouri Police Officer Darren Wilson 5-9 (2015), *https://www.justice.gov/sites/default/files/opa/press-releases/attachments/2015/03/04/doj_report_on_shooting_of_michael_brown_1.pdf*. For a study of federal declination, see Reuters, U.S. Police Escape Federal Charges in 96% of Rights Cases, Fortune (Mar. 13, 2016),*http://fortune.com/2016/03/13/us-police-federal-charges-data* (explaining that between 1995 and 2015, "[federal] prosecutors turned down 12,703 potential civil rights violations out of 13,233 total complaints. By contrast, prosecutors rejected only about 23 percent of referrals in all other types of criminal cases").

[139] See, e.g., *Koon v. United States, 518 U.S. 81, 113-14 (1996)* (remanding for new sentence calculation of police officers convicted in federal court after acquittals in state court); Blinder, supra note 52 (describing federal conviction of South Carolina police officer after an unsuccessful homicide prosecution of the officer in state court); Seven Baltimore City Police Officers Arrested for Abusing Power in Federal Racketeering Conspiracy, U.S. Dep't Just. (Mar. 1, 2017), *https://www.justice.gov/usao-md/pr/seven-baltimore-city-police-officers* -arrested-abusing-power-federal-racketeering.

[140] Moreover, internal Justice Department decisions are not subject to judicial review. See, e.g., U.S. Dep't of Justice, Criminal Resource Manual § 162 (2016); U.S. Dep't of Justice, United States Attorneys' Manual, supra note 55, § 9-2.031.

[141] For a recent example of change in Justice Department policies, see Eric Lichtblau, Sessions Indicates Justice Department Will Stop Monitoring Troubled Police Agencies, N.Y. Times (Feb. 28, 2017), *https://www.nytimes.com/2017/02/28/us/politics/jeff-sessions-crime.html*.

prosecutors to reverse their earlier non-prosecution decisions (or, occasionally, to appointing substitute prosecutors). This "executive separation of powers" model has proven effective, although whether it is effective enough is debated; it depends on whether all cases of police violence that should have been prosecuted - based on the evidence and the public interest in enforcement - were prosecuted. State and federal prosecution offices have distinct professional cultures and are responsive to different constituencies and modes of political supervision, which increases the independence of one from the other. [213] On the other hand, federal prosecution is still to some degree political; it varies with the policy priorities of presidential administrations [214] to a degree that judicial review **[*907]** (in theory) should not. When there is less federal commitment to oversight of states' approaches to police violence, enforcement redundancy is weak. [215] Victims and other interested parties have no other recourse.

C. Underenforcement and Prosecutor Political Accountability

In short, U.S. strategies of enforcement redundancy have a relatively strong track record for some crimes such as public corruption, are robust but vulnerable to political shifts for others such as a police violence, and are notably weak with regard to certain offenses, such as sexual assaults. That last category is important because that weakness extends well beyond sexual assault offenses; many of the routine crimes that make up typical state criminal dockets are not within the scope of federal criminal law enforcement. And since private prosecution and judicial or administrative review of prosecutorial decisions are almost completely absent from state criminal justice systems, there is no charging-decision oversight of state prosecutors' declination decisions and enforcement policies - save for local electoral accountability. In forty-five of fifty states, chief prosecutors are directly elected in local constituencies. [216] This form of democratic accountability operates as a kind of check on underenforcement, although it has significant limits in its capacity to play that role.

State prosecutors' elected status is likely the best explanation **[*908]** for why victim-based checks on declination - private prosecution or judicial review - never became a part of victims' rights reforms enacted in U.S. jurisdictions in recent decades. First, prosecutors are politically powerful groups with legislatures, and they zealously guard their unfettered discretion over criminal charging. [217] Second, it has led even courts to disfavor any degree of judicial review of charging decisions, on the

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On Justice Department professionalism, see Jim McGee & Brian Duffy, Main Justice: The Men and Women Who Enforce the Nation's Criminal Laws and Guard Its Liberties 7-9 (1996); Jed Handelsman Shugerman, The Creation of the Department of Justice: Professionalization Without Civil Rights or Civil Service,*66 Stan. L. Rev. 121, 125-26 (2014).*

[142] The arguable exceptions are federal crimes for race-based and civil rights-related violence and for local officials' abuses of power; in those realms federal authorities responded to widespread failures by state law enforcement and justice systems. See generally Michal R. Belknap, Federal Law and Southern Order: Racial Violence and Constitutional Conflict in the Post-Brown South 154-58 (1987) (highlighting the federal response to southern violence in mid-twentieth century); Rhodri Jeffreys-Jones, The FBI: A History 19-24 (2007) (tracing FBI to nineteenth century federal efforts to combat Ku Klux Klan terrorism of voters); William J. Stuntz, The Collapse of American Criminal Justice 99-157 (2011) (documenting the expansion of federal role in law enforcement and prosecution in the late nineteenth century).

[143] See infra Part III.B.1.

[144] See, e.g., *Screws v. United States, 325 U.S. 91, 110-14 (1945).*

[145] For an indication that federal enforcement policy is designed to protect specific victim interests, see U.S. Dep't of Justice, FY 2014 Annual Performance Report and FY 2016 Annual Performance Plan I-16-17 (2015), *https://www.justice.gov/sites/default/files/doj/pages/attachments/2015/02/06/fy2014aprfy_2016app2.pdf* (describing aspects of the "Vulnerable People Priority Goal").

[146] See Lichtblau, supra note 141.

[147] See Paul G. Cassell & James R. Marsh, Full Restitution for Child Pornography Victims: The Supreme Court's Paroline Decision and the Need for a Congressional Response, *13 Ohio St. J. Crim. L. 1, 7 (2015).*

[148] See U.S. Dep't of Justice, supra note 145, at II-22, I-33 (describing prioritization of federal prosecutions into financial or government fraud and child exploitation).

[149] See Jane Kim, Taking Rape Seriously: Rape as Slavery, *35 Harv. J.L. & Gender 263, 277-83 (2012)* (criticizing inadequate federal criminalization of rape); Donald A. Dripps, Why Rape Should Be a Federal Crime 4 (2018), (unpublished manuscript),

rationale that oversight of prosecutors lies in the political process rather than judicial enforcement of legal parameters for charging. [218] Third, popular and political pressure has succeeded in redressing some underenforcement practices by prosecutors (and police) when victim groups, or issues tied to specific offenses, achieve political potency. Intoxicated driving is perhaps the best example of harmful wrongdoing about which many enforcement agencies have successfully revised their policies to increase enforcement. [219] Domestic violence and sexual assaults are other examples where enforcement shifts have been more limited but still significant. [220]

Responses by local agencies to this type of pressure have taken three basic forms. First, chief prosecutors adopted internal office policies that mandate - or set a strong presumption for - **[*909]** prosecution of specific crimes when evidence is sufficient. [221] Second, prosecutors get specialized training on how to address the particular challenges posed by specific kinds of cases such as domestic violence or sexual assault. [222] Finally, many offices have established dedicated, in-house units of prosecutors who specialize in these same kinds of crimes. [223] States legislatures have encouraged these reforms, [224] but virtually everywhere, the adoption, content, and enforcement of policies is left to local chief prosecutors. No legislation sets specific charging criteria, authorized judicial review, or gives enforceable rights to victims. [225]

These responses to underenforcement are meaningful, but their form is more political than legal. They are the kinds of responses produced by a system of electorally accountable prosecutors and legislatures. [226] Often they are in large part attributable to successful political efforts by advocacy groups. Mothers Against Drunk Driving (MADD), for example, successfully urged reforms of laws and enforcement practices against intoxicated driving. [227] Feminist groups and women's advocates play important, ongoing roles in reforming police and prosecution policies, substantive criminal laws, and evidence rules for domestic **[*910]** violence and sexual assault offenses. [228] These efforts have succeeded in changing attitudes, professional cultures, and enforcement practices in police and prosecution agencies that had contributed to underenforcement in these areas. [229] Prosecution units specializing in offenses such as domestic violence, for example, strengthen professional culture committed to enforcement by attracting lawyers who share that commitment and who develop expertise to act on it. [230]

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https://papers.ssrn.com/sol3 /papers.cfm?abstract_id= 3095741. Without grounds for federal jurisdiction - such as conduct involving interstate travel or occurring on federal property - sexual assaults and other violent offenses are the exclusive province of state officials. Kim, supra, at 277. For examples of the limits built into federal offenses, see18 U.S.C. § 1591(a)(1) (2016) (knowingly recruiting or enticing minors to engage in commercial sex acts); 18 U.S.C. § 2423(b) (2016) (prohibiting travel in interstate commerce for purpose of engaging in illicit sexual conduct with minor females).

[150] The scholarly literature on public corruption is considerable. For a short overview of the debate and the federal law, see David Mills & Robert Weisberg, Corrupting the Harm Requirement in White Collar Crime, 60 Stan. L. Rev. 1371, 1377-94 (2008). For longer treatments, see generally Political Corruption: A Handbook (Arnold J. Heidenheimer et al. eds., 2d ed. 1989) (compiling comparative scholarly work on political corruption); Routledge Handbook of Political Corruption: A Handbook (Paul M. Heywood ed., 2015) (focusing on international and comparative corruption issues).

[151] See, e.g., McDonnell v. United States, 136 S.Ct. 2355, 2365 (2016) (describing quid pro quo requirement for federal bribery offense, ***18 U.S.C. § 201,*** in relation to extortion and honest-services fraud statutes, 18 U.S.C. §§1951(a) & 1346, used to prosecute corruption by state officials); Skilling v. United States, 561 U.S. 358, 407-09 (2010) (clarifying quid pro quo requirements for bribery and kickback conduct in honest-services fraud prosecutions).

[152] See ***18 U.S.C. § 201*** (2012) (criminalizing bribes and gratuities); ***18 U.S.C. § 666*** (2012) (criminalizing theft or bribery related to federally funded programs); ***18 U.S.C.§§1341,*** 1343, 1346 (2016) (criminalizing mail, wire, and "honest services" fraud); 18 U.S.C. § 1951 (2012) (criminalizing extortion "under color of official right").

[153] See, e.g., Nicholas Kusnetz, Only Three States Score Higher Than D+ in State Integrity Investigation; 11 Flunk, Ctr. for Pub. Integrity, https://www .publicintegrity.org/2015/11/09/18693/only-three-states-score-higher-d-state -integrity-investigation-11-flunk (last updated Nov. 23, 2015) (scoring states and explaining methodology; all but three states scored a "D+" or below on A-to-F scale); see also Corruption Perceptions Index 2016, Transparency Int'l (Jan. 25, 2017), https://www.transparency.org/news/feature/corruption_ perceptions_index_2016#table (ranking 174 countries by corruption scores; the United States ranked eighteenth). On the challenges facing corruption measures, see generally Staffan Andersson, Beyond Unidimensional Measurement of Corruption, 19 Pub. Integrity 58 (2017) (analyzing the challenges posed by treating corruption as a one-dimensional phenomenon); Adriana S. Cordis & Jeffrey Milyo, Measuring Public Corruption in the United States: Evidence From Administrative Records of Federal Prosecutions, 18 Pub. Integrity 127 (2016)

Successes notwithstanding, reliance on this kind of political supervision cannot be an equally effective remedy for underenforcement across all contexts. The independence of local prosecution and police agencies means that policies, resources, and constituent support for rigorous enforcement inevitably vary. [231] They will differ not only across localities but also according to the type of offense and the identity of the victim. Some groups, such as victims of intoxicated drivers, can succeed at achieving more rigorous enforcement policies. [232] Other victims with less political support or popular sympathy - undocumented immigrants, sex workers, prison inmates, and casualties of police shootings [233] - have dimmer prospects when prosecutors are responsive to local majorities' preferences. In some places, public **[*911]** sentiment is a force in favor of charging in categories of wrongdoing that have suffered from patterns of underenforcement. In other places, the same can be a force against charging and can reinforce underenforcement practices. Either way, electoral accountability can lead to undue pressure on prosecutors to yield to majoritarian or interest-group pressure to avoid "commiting political suicide." [234]

In short, political supervision, as an institutional structure to minimize unjustified failures to prosecute, is an institutional structure with a highly uneven track record and decidedly mixed prospects. On the other hand, some of the strategies for enforcement redundancy examined above that take the form of legal entitlements would likely also achieve partial success. Private prosecution is an unpromising device to aid certain marginalized victim groups such as inmates, undocumented immigrants, or low-income people generally. Other options - review of declination by courts, or concurrent jurisdiction of a separate prosecution agency - hold somewhat more promise. Judicial review is somewhat more removed from political influence (though perhaps less so in jurisdictions that elect judges), [235] although that mechanism still depends on victims to petition for review. The overlap of federal and state criminal jurisdiction subjects enforcement to review by a rival agency subject to, at worst, different political influences. At best, as with a Justice Department that can minimize political influence with professional and bureaucratic norms, it expands the prospect for less political review. [236]

(criticizing the use of federal convictions data in public corruption analysis and advocating instead for the use of administrative data). For a list of state criminal laws and ethical rules governing corruption, see Penalties for Violations of State Ethics and Public Corruption Laws, Nat'l Conf. St. Legislatures,http://www.ncsl.org/research/ethics/50-state-chart-criminal-penalties -for-public-corr.aspx (last updated Sept. 10, 2018).

[154] Pub. Integrity Section, U.S. Dep't Of Justice, Report to Congress on the Activities and Operations of the Public Integrity Section for 2015, at i (2015), https://www.justice.gov/criminal/file/891961/download.

[155] See, e.g., id. at 17-19 (providing examples of the Justice Department's prosecution of state and local officials).

[156] Id. at 23-24 tbl.2 (tracking the number of convictions of corrupt public officials during 1996-2015); id. at 25-28, tbl.3 (tracking public corruptions prosecutions by federal district during 2006-2015); Patricia Salkin & Bailey Ince, It's a "Criming Shame": Moving from Land Use Ethics to Criminalization of Behavior Leading to Permits and Other Zoning Related Acts, 46 Urb. Law. 249, 250 (2014) (describing federal prosecution of state and local officials).

[157] Fed. Bureau of Investigation, U.S. Dep't of Justice, The FBI Story: 2017, at 11 (2017), https://www.fbi.gov/file-repository/the-fbi-story-2017 .pdf/view (describing public corruption as a "key responsibility").

[158] See, e.g., id. at 10-20 (providing specific examples of federal public corruption prosecution for various types of conduct).

[159] Id.

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CONCLUSION

All justice systems suffer from pockets of unjustified, even pernicious, underenforcement. All recognize that public prosecutors can be vulnerable to biases and institutional interests that distort enforcement decisions. Especially in recent decades, nearly all have adopted mechanisms to address those risks. Outside the United States, victim rights legislation has included provisions directed at unjustified decisions not to prosecute. In other common law countries and in Europe, most victims may now either seek independent review of prosecutors or initiate prosecutions on their own. Independent review keeps the safeguard against underenforcement in public hands while strengthening the principle that charging decisions should be nonpolitical and ministerial in nature. Victim rights reforms in general manifest a judgment that modern criminal justice had focused excessively on public interests and unduly neglected victims' private interests in criminal prosecutions. Authorizing victims to challenge declination decisions extends this idea by recognizing victims' private stake in those decisions and enabling victims to serve the public interest in preventing unjustified failures to prosecute. [237]

Virtually all U.S. jurisdictions reject both of those strategies. [238] And rather than insulate their prosecutors from political **[*913]** influence, most states rely on electoral politics for oversight of prosecution practices. Instead, the U.S. model opts for duplicative federal-state jurisdiction against a background of politically attuned state prosecutors. Both this federalism model of redundant prosecutorial authority - which may be reduced this term by the Supreme Court's decision in Gamble - and the model of politically responsive prosecutors have proven effective at redressing some types of underenforcement. Both serve some victims' interests without taking the form of victim rights. And both reflect a preference for political over legal safeguards against biased or ill-conceived uses of prosecutorial discretion.

American criminal justice is more sanguine than other legal systems about the downsides of prosecutors' electoral accountability and attention to majoritarian sentiments. U.S. prosecutors' democratic legitimacy works against arguments for more formal oversight or regulation. Even against the potent political power of victims' rights movements, unfettered executive charging discretion has proven immutable. [239] But federal prosecutors provide significant oversight, at least for some

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[160] United States v. Alfisi, 308 F.3d 144, 155-56 (2d Cir. 2002) (Sack, J., dissenting) (arguing that payments to federal officials prosecuted under ***18 U.S.C. § 201*** caused no clear harm or "corruption"); Mills & Weisberg, supra note 150, at 1373-74 (discussing the role of fiduciary duties in criminal liability); id. at 1377, 1386-90, 1404-05 (discussing uncertainty of "harm" in some contexts); id. at 1395-1400 (discussing honest services); Lex Hemphill, Acquittals End Bid Scandal that Dogged Winter Games, N.Y. Times, Dec. 6, 2003, at D1 (reporting a federal district judge's criticism of the prosecution, saying "in his 40 years of working in the criminal justice system, he had never seen a case so devoid of "criminal intent or evil purpose'").

[161] For Supreme Court decisions rejecting broad applications of federal anti-corruption statutes, see generally McDonnell v. United States, 136 S. Ct. 2355 (2016) (reversing the former Virginia Governor's conviction for honest-services fraud and extortion); McNally v. United States, 483 U.S. 350 (1987) (reversing the conviction of state officials and holding that federal mail fraud statute, ***18 U.S.C. § 1341,*** does not apply to schemes to defraud state citizens of the intangible "right to have the Commonwealth's affairs conducted honestly"). As a matter of statutory interpretation, the Court requires a "clear statement" that Congress intends a federal criminal statute to duplicate a state crime and thereby "effect a significant change in the sensitive relation between federal and state criminal jurisdiction." United States v. Bass, 404 U.S. 336, 349-50 (1971); see also Rewis v. United States, 401 U.S. 808, 811-12 (1971). But Congress has made such intent sufficiently clear for the Court in numerous statutes, including those at issue in Bass (18 U.S.C. § 1202(a), now codified at ***18 U.S.C. § 922***(g)) and in Rewis (18 U.S.C. § 1952). See, e.g., Perrin v. United States, 444 U.S. 37, 50 (1979) (finding that § 1952 reflects congressional intent "to alter the federal-state balance in order to reinforce state law enforcement").

[162] See, e.g., Roderick M. Hills, Jr., Corruption and Federalism: (When) Do Federal Criminal Prosecutions Improve Non-Federal Democracy?, 6 Theoretical Inquiries L. 113, 137-44 (2005) (arguing that federal enforcement of public corruption in local governments harms local styles of democracy); Harvey A. Silverglate & Emma Quinn-Judge, Tawdry or Corrupt? McDonnell Fails to Draw a Clear Line for Federal Prosecution of State Officials, 2016 Cato Sup. Ct. Rev. 189, 213-19 (2016) (arguing that the honest services statute is too vague to be fairly enforced); cf. John C. Coffee, Jr., Modern Mail Fraud: The Restoration of the Public/Private Distinction, 35 Am. Crim. L. Rev. 427, 430-31 (1998) (arguing that federal prosecutors rely on broad federal common law crimes in fraud cases against state and local public officials); Salkin & Ince, supra note 156, at 266-67 (describing aggressive federal enforcement of public corruption in the context of land

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use). But see Mark S. Gaioni, Federal Anticorruption Law in the State and Local Context: Defining the Scope of ***18 U.S.C. § 666,*** *46 Colum. J.L. & Soc. Probs. 207, 237-45 (2012)* (arguing for broad interpretation of § 666 to cover state and local officials).

[163] See, e.g., *18 U.S.C. § 1346* (2012) (criminalizing "honest services" fraud). The statute was enacted in 1988 in response to the Supreme Court's 1987 decision in United States v. McNally, which held that ***18 U.S.C. § 1341*** did not cover "honest services" fraud. Gaioni, supra note 162, at 243 n.192.

[164] See, e.g., *Perrin, 444 U.S. at 50* (finding that section 1952 reflects congressional intent "to alter the federal-state balance in order to reinforce state law enforcement").

[165] See, e.g., *18 U.S.C. § 1952* (2012) (prohibiting interstate travel for "unlawful activity," which can be made unlawful by state law); *Perrin, 444 U.S. at 50* ("In defining "unlawful activity' [in *18 U.S.C. § 1952],* Congress has clearly stated its intention to include violations of state as well as federal bribery law."); *United States v. Welch, 327 F.3d 1081, 1092-1103 (10th Cir. 2003)* (reinstating an indictment and holding that Utah law serves as predicate to define violations of *18 U.S.C. § 1952).*

[166] See Kim, supra note 149; Dripps, supra note 149, at 3 (noting that sexual assaults in federal law are confined to very limited contexts, such as human trafficking).

[167] See Kim, supra note 149.

[168] See Lynching in America: Confronting the Legacy of Racial Terror, Equal Just. Initiative, *https://lynchinginamerica.eji.org/report* (last visited Oct. 30, 2018) ("Of all lynchings committed after 1900, only 1 percent resulted in a lyncher being convicted of a criminal offense" (citing Paula J. Giddings, Ida: A Sword Among Lions 473-74 (2008))). Data on prosecutorial charging decisions is harder to come by, but clearance rates for homicides - meaning the percentage of cases police resolve, usually by arrest - are higher for homicides than other offense categories. See 2016 Crime in the United States, FBI: UCR, *https://ucr.fbi.gov/crime-in-the-u.s/2016/crime-in-the-u.s.-2016/tables/table-17* (last visited Oct. 30, 2018) (reporting that the 2016 national clearance rate for homicides was 59.4%, compared to 45.6% for all violent crime and 18.3% for property crimes).

[169] See S. Rep. No. 103-138, at 42 (1994) ("Police may refuse to take reports [of crimes against women]; prosecutors may encourage defendants to plead to minor offenses … . At every step of the way, the criminal justice system poses significant hurdles for victims."); Catharine A. MacKinnon, Rape Redefined, *10 Harv. L. & Pol'y Rev. 431, 439 (2016)* ("One out of about ten acts of rape or attempted rape that fit basic legal definitions in the United States is reported to authorities. Dramatically fewer [reported cases] are prosecuted or result in convictions … ."). For detailed examination of prosecutor decision-making on sexual assault complaints in three jurisdictions, see Cassia C. Spohn et al., Nat'l Criminal Justice Reference Serv., Prosecutors' Charging Decisions in Sexual Assault Cases: A Multi-Site Study 85-88 (2001), *https://www.ncjrs.gov/pdffiles1/nij/grants/197048.pdf*.

[170] See Dripps, supra note 149, at 6 & n.25 (noting a National Violence Against Women survey by the Centers for Disease Control found twice as many rapes as the NCVS survey reported for the same year). See generally Candace Kruttschnitt et al., Estimating the Incidence of Rape and Sexual Assault (2014) (describing the reasons why it is "highly likely" that the National Crime Victimization Survey, conducted by the Bureau of Justice Statistics, underestimates rapes and other sexual assaults).

[171] Kruttschnitt et al., supra note 170; Dripps, supra note 149.

[172] Dripps, supra note 149, at 9 (summarizing and comparing Federal Bureau of Investigation Uniform Crime Reports and National Crime Victimization Survey data).

[173] See supra note 169 and accompanying text.

[174] Dripps, supra note 149, at 13-15 (summarizing clearance-rate data from Federal Bureau of Investigation Uniform Crime Reports and from the Los Angeles County Sheriff's Department).

[175] See, e.g., Cassia Spohn & Katharine Tellis, Nat'l Criminal Justice Reference Serv., Policing and Prosecuting Sexual Assault in Los Angeles City and County VII (2012), *https://www.ncjrs.gov/pdffiles1/nij/grants/237582.pdf*.

[176] Id. at VII-VIII, 8. Data on clearance rates is itself suspect; departments sometimes do not disclose all reports of sexual assaults they receive. Id. at IV (finding that the L.A. Police Department and the L.A. Sheriff's Department both substantially exaggerated their clearance rates).

[177] Rape Kit Backlogs: Failing the Test of Providing Justice to Sexual Assault Survivors: Hearing Before the Subcomm. on Crime, Terrorism, and Homeland Sec. of the H. Comm. on the Judiciary, 111th Cong. 21 (2010) (statement of Rep. Anthony Weiner, Member, H.

Comm. on the Judiciary) (noting that there are over 542,000 untested rape kits); Caitlin Dickson, How the U.S. Ended Up With 400,000 Untested Rape Kits, Daily Beast (Sept. 23, 2014), https://www .thedailybeast.com/how-the-us-ended-up-with-400000-untested-rape-kits; Dayton Uttinger, Why Is There Still a Rape Kit Backlog?, Women's Media Ctr. (Aug. 1, 2017),*http://www.womensmediacenter.com/fbomb/why-is-there-still-a-rape-kit-backlog* ("There are an estimated 175,000 untested rape kits … across the US … .").

[178] See Office on Violence Against Women, U.S. Dep't of Justice, Sexual Assault Kit Testing Initiatives and Non-Investigative Kits 3 (2017), *https://www.justice.gov/ovw/page/file/931391/download* (noting that $ 100 million was awarded to states and localities in 2014-16 to reduce rape kit backlog).

[179] Note, Recent Statutory Developments in the Definition of Forcible Rape, 61 Va. L. Rev. 1500, 1505-07 (1975).

[180] See, e.g., ***State v. Sibley, 33 S.W. 167, 171 (Mo. 1895)*** ("The rule in this state permitting a witness to be impeached by proof of general reputation for unchastity is confined to females."); *People v. Abbot, 19 Wend. 192, 194 (N.Y. 1838)* (permitting questions to the rape complainant about her past sexual conduct because in rape prosecutions "the material issue is on the willingness or reluctance of the prosecutrix - an act of the mind").

[181] Susan Estrich, Real Rape 8 (1987).

[182] See id. at 8-22 (describing traditional rape definitions, spousal exception, evidentiary rules, and police responses to rape reports); Recent Statutory Developments in the Definition of Forcible Rape, supra note 179, at 1505-07 (describing the "utmost resistance" requirement); see also *State v. Terry, 215 A.2d 374, 376 (N.J. Super. Ct. App. Div. 1965)* (affirming that, to prove liability for rape, "it must be shown that [the victim] did, in fact, resist the assault").

[183] Kathleen F. Cairney, Addressing Acquaintance Rape: The New Direction of the Rape Law Reform Movement, *69 St. John's L. Rev. 291, 298-99 (2012).*

[184] See *Fed. R. Evid. 412*; Leah DaSilva, The Next Generation of Sexual Conduct: Expanding the Protective Reach of Rape Shield Laws to Include Evidence Found on Myspace, 13 Suffolk J. Trial & App. Advoc. 211, 219 (2008) ("In 1974, Michigan became the first jurisdiction to enact a rape shield law. The federal government and remaining forty nine states followed, most within several years."); cf. Joel E. Smith, Annotation, Constitutionality of "Rape Shield" Statute Restricting Use of Evidence of Victim's Sexual Experiences, 1 A.L.R. 4th 283 (2018) (discussing constitutional limits on rape shield rules).

[185] See *Fed. R. Evid. 413*, *414*.

[186] See, e.g., Cyrus R. Vance, Jr., N.Y. Cty. Dist. Attorney's Office, Sexual Assault and the Criminal Justice System (2010), *http://manhattanda.org/sites/default/files/Sex_Crimes.pdf* [*https://web.archive.org/web/20170702150412/ http://manhattanda.org/sites/default/files/Sex_Crimes* .pdf] (describing the "Sex Crimes Prosecution Unit" and special units for sexual assaults crime and victims in hospitals police precincts, and social service agencies). See generally Jennifer G. Long & John Wilkinson, The Benefits of Specialized Prosecution Units in Domestic and Sexual Violence Cases, AEquitas: Strategies Brief, Dec. 2011, at 1, 1 (describing how experienced prosecutors improve handling of domestic and sexual violence cases). Similar strategies of offense reform and creation of dedicated prosecution units have more recently been strategies against another context of endemic underenforcement - crimes against inmates. See Alysia Santo, Preying on Prisoners: In Texas, Staffers Rarely Go to Jail for Sexually Abusing Inmates, Marshall Project (June 7, 2015), *https://www.themarshallproject.org/2015/06/17/preying-on-prisoners* (describing a special prosecution unit in Texas focused on crimes against inmates, and noting that between 1990 and 2006, the number of states with statutes that expressly criminalize sexual abuse of inmates rose from eighteen to fifty, and prosecution rates rose from thirty-seven to forty-nine percent of staff sexual misconduct case referrals).

[187] See *State v. Stahl, 855 N.E.2d 834, 836 (Ohio 2006)* (describing the "Developing Options for Violent Emergencies (DOVE) unit" in a hospital designed to gather evidence from and provide care to sexual assault victims); History of the Movement, Wash. Coalition Sexual Assault Programs, http://www .wcsap.org/history-movement (last updated May 9, 2016) (describing the establishment of the first rape crisis centers in 1972). See generally Office Violence Against Women, U.S. Dep't of Justice, A National Protocol for Sexual Assault Medical Forensic Examinations: Adults/Adolescents (2013), *https://www.ncjrs.gov/pdffiles1/ovw/241903.pdf* (describing recommendations, techniques, and strategies for health care providers to maximize forensic evidence gathering during provision of medical care).

important kinds of crimes within states' jurisdictions. This federalism-based model of enforcement redundancy is a distinctive if

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[188] Cassia Spohn & Julie Horney, Rape Law Reform: A Grassroots Revolution and Its Impact 77 (1992) (describing expectations that legal reforms would improve prosecution rates); id. at 100 ("Legal changes did not produce the dramatic results that were anticipated by reformers. The reforms had no impact in most of the jurisdictions.").

[189] Jennifer L. Truman & Rachel E. Morgan, Bureau Justice Statistics, U.S. Dep't of Justice, Criminal Victimization, 2015, at 2 tbl.1 (2016), https://www.bjs.gov/content/pub/pdf/cv15.pdf (reporting that the National Crime Victimization Survey estimated 431,840 rapes/sexual assaults in 2015); Crime in the United States by Volume and Rate Per 100,000 Inhabitants, 1996 -2015, Fed. Bureau Investigation, https://ucr.fbi.gov/crime-in-the-u.s/2015/crime-in-the-u.s.-2015/tables/table-1 (last visited Oct. 30, 2018) (reporting 124,047 rape reports under the "revised definition").

[190] Cf. Jack M. Balkin & Reva B. Siegel, Principles, Practices, and Social Movements, 154 U. Pa. L. Rev. 927, 946-50 (2006) (arguing that social movements significantly shape the application of constitutional principles); Reva B. Siegel, Text in Contest: Gender and the Constitution from a Social Movement Perspective, 150 U. Pa. L. Rev. 279, 328-44 (2001) (arguing that the history of the Nineteenth ***Amendment*** and the Equal Rights ***Amendment*** show that the U.S. Constitution is amenable to contestation by social movements).

[191] Violence Against Women Act of 1994, Pub. L. 103-322 (1994) (codified at 34 U.S.C.§§12291-12511) (2017) (establishing a broad set of policies directed at violence against women that creates no federal criminal offenses).

[192] Dripps, supra note 149, at 46-49, app. I. For an earlier proposal along the same lines, see Kim, supra note 149, at 304-09.

[193] E.g., Office on Violence Against Women, supra note 178 and accompanying text.

[194] The statutory authority is 42 U.S.C. § 14141 (2016).

[195] See Harmon, Policing Reform, supra note 21 (discussing structural reform aimed at police violence without noting any instances of targeting sexual assault offenses).

[196] Leading observers view this structural reform as insufficient to address the scope of the police-misconduct problems. See id. at 59-61 (describing injunctive relief under 42 U.S.C. § 14141, noting limits on data about police misconduct, and explaining how insufficient data limits the effectiveness of reform efforts). On the prospect of reduced federal commitment to this strategy in the Trump administration, see U.S. Attorney Gen., supra note 24; Horwitz et al., supra note 24.

[197] See Dripps, supra note 149, at 19 & n.100 (citing five federal actions under § 14141 addressing local agencies' responses to sexual assault crimes).

[198] That is, federal criminal law is effective at successful prosecutions, if not at reducing the underlying social problem targeted by criminal law. See generally, e.g., Steven B. Duke & Albert C. Gross, America's Longest War: Rethinking Our Tragic Crusade Against Drugs (1993) (examining and critiquing American drug policies).

[199] See, e.g., ***18 U.S.C. § 241*** (2012) (criminalizing conspiracy); id. § 242 (criminalizing willful deprivation of federal rights while acting under color of law); id. § 249 (criminalizing willful bodily injury because of victim's race, religion, sexual orientation, or gender identity). Federal prosecutors focus on other serious direct-victim crimes as well, such as human trafficking and child pornography. See U.S. Dep't of Justice, supra note 145 (describing prioritization of such cases). But federal involvement in that realm is presumably motivated not so much by a need for oversight of untrustworthy state prosecutors as by the greater resources, expertise, and interstate jurisdictional advantages that federal prosecutors bring to such cases. Criminal prosecution is only one aspect of federal policies to reduce custodial deaths and improper uses of force by police. Other strategies include investigating abuse and corruption in local police agencies and using civil injunctive remedies against those agencies to change patterns of wrongdoing, as well as gathering data on custodial deaths and police uses of force. See Harmon, Policing Reform, supra note 21; Simone Weichselbaum, Policing the Police: As the Justice Department Pushes Reform, Some Changes Don't Last, Marshall Project (May 26, 2015), https://www.themarshallproject.org/2015/04/23/policing -the-police (describing the difficulties in achieving lasting reforms in local police departments through federal consent decrees).

[200] See ***18 U.S.C. § 242*** (liability for an official who "willfully subjects any person … to the deprivation of any [federal] rights"); United States v. Screws, 325 U.S. 91, 103 (1945) (interpreting § 242's willfulness term to require "specific intent to deprive a person of a federal right").

[201] The prosecution of South Carolina police officer Michael Slager provides an example. State prosecutors charged Slager with murder; federal prosecutors charged him with criminal violation of civil rights under ***18 U.S.C. § 242.*** For an example of this contrast between state and federal charges for the same offense, see Blinder, supra note 52; Michael S. Schmidt & Matt Apuzzo, Officer Is Charged with Murder of a Black Man Shot in the Back, N.Y. Times, Apr. 8, 2015, at A1.

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[202] See *Perrin v. United States, 444 U.S. 37, 50 (1979)* (broadly interpreting "bribery" in *18 U.S.C. § 1952* to include bribery of private individuals); supra Part III.B.1 and note 161 (citing Perrin in discussion of anti-corruption prosecutions under *18 U.S.C. § 1952).*

[203] See, e.g., *Wis. Stat.§§175.47*, *950.04(1v)(do)*, *950.08(2g)(h)* (2014) (codifying Wis. Act 348 (2013)) (requiring investigations of "officer-involved deaths" to be conducted by investigators from a different agency).

[204] See Data Collection: Mortality in Correctional Institutes (MCI) (Formerly Deaths in Custody Reporting Program (DCRP)), Bureau Just. Stat., *https://www.bjs.gov/index.cfm?ty=dcdetail&iid=243* (last visited Oct. 30, 2018) (providing data collection since 2000 for jails, since 2001 for prisons, and since 2003 during arrests). The Death in Custody Reporting Act of 2000,*42 U.S.C. § 13704* (2006), required local agencies to report deaths until it lapsed in 2006. Hunter Schwartz, Congress Decides to Get Serious About Tracking Police Shootings, Wash. Post (Dec. 11, 2014), *https://www.washingtonpost.com/news/post-politics/wp/2014/12/11/congress-decides-to-get-serious-about-tracking* -police-shootings. It was renewed in 2014. Death in Custody Act of 2013, Pub. L. 113-242,***128 Stat. 2860*** (codified as amended in scattered sections of 42 U.S.C). In the interim years, the Bureau collected data voluntarily reported by local agencies. Pete Kasperowicz, House Bill Would Require States to Report on Prisoner Deaths, Hill (Dec. 6, 2013), *https://thehill.com/blogs/floor-action/government-oversight/192354-house-to-require-states-to-report-on-prisoner* -deaths.

[205] See supra note 113.

[206] E.g., Ed Krayewski, Prosecutors in Chicago, Cleveland Lose Re-Election Bids After Police Abuse Controversies, Reason (Mar. 16, 2016), http://reason .com/blog/2016/03/16/prosecutors-in-chicago-cleveland-lose-re.

[207] Id.; see also Justin Glawe, Anita Alvarez, Chicago's Top Prosecutor, Cleared Killer Cops 68 Times, Daily Beast (Mar. 14, 2016), http://www .thedailybeast.com/articles/2016/03/14/anita-alvarez-chicago-s-top-prosecutor -cleared-killer-cops-68-times.html.

[208] See Manslaughter Conviction for Ex-Officer, N.Y. Times, Aug. 5, 2016, at A15; Richard Perez-Pena, Officer Indicted in Shooting Death of Unarmed Man, N.Y. Times, July 30, 2015, at A1; Mark Berman, Minn. Officer Acquitted in Shooting of Philando Castile During Traffic Stop, Dismissed From Police Force, Wash. Post (June 17, 2017), *https://www.washingtonpost.com/news/post* -nation/wp/2017/06/16/minn-officer-acquitted-of-manslaughter-for-shooting -philando-castile-during-traffic-stop; Chris Dixon, Ex-Officer Seeks Bond in Shooting Death of Walter Scott, N.Y. Times (Sept. 11, 2015), https://www. nytimes.com/2015/09/12/us/officer-seeks-bond-in-shooting-death-of-walter -scott.html (stating that officer was charged with murder); Wil S. Hylton, Baltimore vs. Marilyn Mosby, N.Y. Times Mag. (Sept. 28, 2016), *https://www.nytimes.com/2016/10/02/magazine* /marilyn-mosby-freddie-gray-baltimore.html (describing the failure to convict any of six officers indicted for the April 2015 death of Freddie Gray); Justin Juozapavicius, Tulsa Officer Acquitted In Man's Shooting Death Is Returning To The Police Force, Associated Press (May 19, 2017), *https://www.apnews.com/9af40bcdbbd84f6e95fb3a430d4016c0*.

[209] Monica Davey & Mitch Smith, Justice Department Is Expected to Investigate Chicago Police, N.Y. Times, Dec. 7, 2015, at A10 (reporting on the Justice Department's investigation into the patterns and practices of the Chicago Police Department in the wake of Laquan McDonald shooting); Mitch Smith, Chicago Officer Pleads Not Guilty to Charge of Murder in Death of a Teenager, N.Y. Times, Dec. 30, 2015, at A12 (stating that a police officer was charged for the 2014 fatal shooting of a teenager just before video footage of the incident was released).

[210] For one notable political response, see La. Stat. Ann. §§14:107.2(A), (E) (2018) (creating the "Blue Lives Matter" law); Kevin Conlon, Louisiana Governor Signs "Blue Lives Matter' Bill, CNN (May 27, 2016), *https://www.cnn.com/2016/05/26/us/louisiana-blue-lives-matter-law/index.html* (describing passage of House Bill 953).

[211] See, e.g., W. David Ball, Tough on Crime (on the State's Dime): How Violent Crime Does Not Drive California Counties' Incarceration Rates - And Why It Should, *28 Ga. St. U. L. Rev. 987, 1018-34 (2012)* (analyzing data from 2000-2009 and describing how county-level criminal justice officials, including prosecutors, vary greatly in their use of state incarceration as a response to crime); Erika Martin, While Some California DAs Are Throwing Out Old Pot Convictions, L.A. County's Jackie Lacey Takes a Different Path, KTLA5 (Feb. 3, 2018), *https://ktla.com/2018/02/03/while-some-california-das-are-throwing-out* -old-pot-convictions-angelenos-will-have-to-be-proactive-in-clearing-records (describing different policies among California district attorneys on expungement of marijuana offenses); cf. Civil Rights Div., U.S. Dep't of Justice, Investigation of the Ferguson Police Department 10-15 (2015), *https://www.justice.gov/sites/default/files/opa/press-releases/attachments/2015/03/04/ferguson_police_department_report.pdf* (describing prosecution policies motivated by revenue-generating goals).

[212] The alternative of administrative review within the Crown Prosecution Service relies on whatever independence is sustained by the bureaucratic hierarchy, administrative regulations, and professional norms. See supra note 111 and accompanying text.

not unique hybrid: it provides independent review removed from local electoral politics, yet power remains in the hands of

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[213] U.S. Attorneys and the U.S. Attorney General are political appointees, U.S. Const. art. II, § 2 (Appointments Clause); ***28 U.S.C. § 541*** (2012) ("The President shall appoint … a United States attorney for each judicial district."), although much of the Justice Department staff are nonpolitical, civil service appointees. See Government Ethics Outline, U.S. Dep't Just., https://www .justice.gov/jmd/government-ethics-outline (last updated July 5, 2017) (explaining ethics rules for "non-career" political appointees and for career employees).

[214] See Sanford C. Gordon, Assessing Partisan Bias in Federal Public Corruption Prosecutions, 103 Am. Pol. Sci. Rev. 534, 549 (2009) (finding evidence of political party bias among federal prosecutors).

[215] The clearest historical example would be the post-Reconstruction decades, starting roughly after 1876, when the federal government retreated from civil rights enforcement in the former Confederate states, including from prosecutions for criminal rights violations and offenses that states declined to charge, including for homicides. See generally Eric Foner, Reconstruction: America's Unfinished Revolution, 1863-1877, at 524-86 (2014) (describing declining enthusiasm for civil rights enforcement and waning Republican political influence in the South); William Gillette, Retreat from Reconstruction, 1869-1879, at 190-200 (1979) (describing Southern Democrats efforts to resist civil rights enforcement); George Rutherglen, Civil Rights in the Shadow of Slavery: The Constitution, Common Law, and the Civil Rights Act of 1866, at 95-100 (2013) (describing Supreme Court decisions limiting the enforcement of the Civil Rights Act of 1866).

[216] Alaska, Connecticut, and New Jersey do not elect prosecutors. Perry, supra note 122, at 2. Delaware and Rhode Island elect state attorneys general, whose appointed staff handle all prosecutions. Id. at 11. Except in these jurisdictions, state attorneys general and justice departments generally have little authority over local prosecutors' offices. Cf. Michael J. Ellis, The Origins of the Elected Prosecutor, *121 Yale L.J. 1528, 1528 n.1 (2012)* (noting that elected prosecutors are unique to the United States).

[217] A classic account of prosecutors' political influence is William J. Stuntz, The Pathological Politics of Criminal Law, *100 Mich. L. Rev. 505, 546-57 (2001).* For an insightful account of federal prosecutors successfully convincing Congress to expand their discretion at the expense of judges' sentencing authority, see *United States v. Kupa, 976 F. Supp. 2d 417, 419-27 (E.D.N.Y. 2013)* (describing the legislative history and Justice Department lobbying related to federal drug statutes, notably ***21 U.S.C. § 841*** (2012)).

[218] See, e.g., *Milliken v. Stone, 7 F.2d 397, 399 (S.D.N.Y. 1925),* aff'd *16 F.2d 981 (2d Cir. 1927)* ("The remedy for [dereliction of the prosecutor's duty] is with the executive and ultimately with the people."); *In re Hickson, 2000 PA Super 402, P 36* ("The prosecutor is elected to run her office using her broad discretion fairly and honestly. If she fails to do so, … the remedy lies in the power of the electorate to vote her out of office."); *In re Padget, 678 P.2d 870, 873-74 (Wyo. 1984)* ("District and county attorneys hold elective offices; if their constituents are unsatisfied, they are free to express their feelings at the voting polls."); cf. *Cheney v. U.S. Dist. Court, 542 U.S. 367, 386 (2004)* ("The decision to prosecute a criminal case … is made by a publicly accountable prosecutor."). For discussion of this point, see Brown, supra note 126, at 33-41.

[219] See Adam M. Gershowitz, 12 Unnecessary Men: The Case for Eliminating Jury Trials in Drunk Driving Cases, *2011 U. Ill. L. Rev. 961, 966-69, 984-87 (2011).*

[220] Emily J. Sack, Battered Women and the State: The Struggle for the Future of Domestic Violence Policy, *2004 Wis. L. Rev. 1657, 1689-90 (2004).*

[221] Police departments also widely adopted mandatory arrest policies, especially for domestic violence offenses. For discussions and examples of both police and prosecution policies on domestic violence and sexual assault, see Aya Gruber, The Feminist War on Crime, *92 Iowa L. Rev. 741, 760 & n.90 (2007);* Sack, supra note 220. Note how this resembles the mandatory prosecution duty familiar in European systems, although it is an internal policy rather than statutory mandate. See supra Part II.B.1.

[222] See supra note 186 and accompanying text.

[223] Id.

[224] See, e.g., *Fla. Stat. § 741.2901(1)*-(2) (2018) ("Each state attorney shall develop special units or assign prosecutors to specialize in the prosecution of domestic violence cases … [who] shall receive training in domestic violence issues… . The state attorney in each circuit shall adopt a pro-prosecution policy for acts of domestic violence … ."); *Wis. Stat. § 968.075(7)* (2018) ("Each district attorney's office shall develop, adopt and implement written policies encouraging the prosecution of domestic abuse offenses.").

[225] Some state legislatures enact voluntary charging criteria in statutes that affirm prosecutorial discretion. See, e.g., *Wash. Rev. Code § 9.94A.411* (2018) ("A prosecuting attorney may decline to prosecute, even though technically sufficient evidence to prosecute exists," and providing a "Guideline/Commentary" for such decisions).

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[226] See supra note 224 (citing state statutes in Florida and Wisconsin that encourage or mandate local prosecutors to adopt policies that improve enforcement).

[227] Gershowitz, supra note 219.

[228] On domestic violence and rape offenses, see Gruber, supra note 221, at 752-63 (recounting the feminist movement's efforts to reform domestic violence and rape prosecution law and policies); id. at 760 & n.90 (citing statutes that require prosecutors to adopt "pro-prosecution" policies for domestic violence); id. at 763-74 (describing the history of victim rights' movement); Sack, supra note 220, at 1666, 1689-90 (2004) (describing the women's movement as focused on domestic violence since the 1960s and arguing that mandatory prosecution policies are necessary for police and prosecutors to make the "right choices"); Christine O'Connor, Note, Domestic Violence No-Contact Orders and the Autonomy Rights of Victims, *40 B.C. L. Rev. 937, 942-43 (1999)* (arguing that prosecutors' view of domestic violence as a private problem contributed to reluctance to prosecute). On drunk-driving law and policy, see Gershowitz, supra note 219 (describing efforts by MADD and other groups to toughen laws and enforcement efforts against drunk driving and summarizing subsequent law reform).

[229] See supra note 228.

[230] Cf. Long & Wilkinson, supra note 186, at 1 (explaining that specialized prosecution units provide prosecutors with the opportunity to work with "community partners").

[231] See, e.g., Jeffrey Ulmer & Christopher Bader, Do Moral Communities Play a Role in Criminal Sentencing? Evidence from Pennsylvania, 49 Soc. Q. 737, 753, 757 (2008) (finding in county-level data that "Christian religious homogeneity" increases the likelihood of incarceration, especially when Christian denominations are civically engaged, partially through the effect of local Republican Party dominance via the election of judges and prosecutors).

[232] Gershowitz, supra note 219.

[233] See generally Richard Perez-Pena & Timothy Williams, Glare of Video Is Shifting Public's View of Police, N.Y. Times, July 31, 2015, at A1 (describing survey data on public views about police and apparent effects of video evidence on public opinion); Santo, supra note 186 (describing enforcement challenges for crimes against prison inmates).

[234] Ian Lovett, Los Angeles Joins Debate on Force After Police Killing of a Homeless Man, N.Y. Times, April 17, 2016, at A12 (describing the "pressure that prosecutors now face to move aggressively against officers who kill civilians" and quoting an activist who says that the Los Angeles prosecutor's failure to indict in one case would be "political suicide").

[235] See Carlos Berdejo & Noam Yuchtman, Crime, Punishment, and Politics: An Analysis of Political Cycles in Criminal Sentencing, 95 Rev. Econ. Stat. 741, 754-55 (2013) (finding that elected judges in Washington state assign longer sentences in years closest to elections); Sanford C. Gordon & Gregory A. Huber, The Effect of Electoral Competitiveness on Incumbent Behavior, 2 Q.J. Pol. Sci. 107, 133 (2007) (comparing partisan and nonpartisan judicial elections in Kansas and finding strong effects on sentencing when judges in partisan elections expect or face challengers). See generally, Jed Handelsman Shugerman, The People's Courts (2012) (providing a history of elected judges).

[236] For a knowledgeable account of the U.S. Justice Department's traditions of professionalism that mostly minimize political influence in charging decisions, see generally Samuel W. Buell, Capital Offenses: Business Crime and Punishment in America's Corporate Age (2016). But see Gordon, supra note 214; cf. Scott Ashworth, Electoral Accountability: Recent Theoretical and Empirical Work, 15 Ann. Rev. Pol. Sci. 183, 183-201 (2012) (surveying theoretical and empirical research into the connection between political accountability and policy decisions).

[237] See, e.g., *In re Hickson, 2000 PA Super 402, P 41* (finding that private prosecutions "constitute[] a recognition by the legislature that the office of the district attorney should be subject to a system of checks and balances"); *In re Piscanio, 344 A.2d 658, 660-61 (Pa. Super. Ct. 1975)* ("The judge's independent review of the complaint checks and balances the district attorney's decision and further hedges against possibility of error.").

[238] Outside the United States, prosecution agencies are commonly under a politically accountable justice minister or attorney general, whose political judgment, in principle, operates only at the level of broad policy and should not interfere with specific case decisions. See, e.g., Prosecution of Offences Act 1974, § 2(5) (Act No. 22/1974) (Ir.) http://*www.irishstatutebook.ie/eli/1974/act/22/section/2/enacted/en/index.html* ("The Director [of Public Prosecutions] shall be independent in the performance of his functions."). Australia's Office of the Commonwealth Director of Public Prosecutions, whose director is appointed for a seven-year term, is an independent prosecution service within the Commonwealth Attorney-General's portfolio, but functions independently of the Attorney-General and the political process. Director of Public Prosecutions Act 1983 (Cth) (Austl.) (as amended 2012); About Us, Commonwealth Dir. Pub. Prosecutions,*http://www.cdpp.gov.au/AboutUs* (last visited Oct. 30, 2018); see also Mark Findlay et al., Australian Criminal Justice 125-26 (1994) (describing "the development of prosecutorial independence from the executive"). Canada's Public

professional, rival, and politically accountable executive branch officials.

The insight of the U.S. approach is that, for many types of **[*914]** underenforcement, federal oversight combined with democratically responsive local prosecutors can perform the same function as judicial review and private prosecution of correcting bad declination decisions driven by institutional allegiances, cultural biases, and favoritism. Politically responsive criminal justice sometimes works relatively well at changing prosecution practices to serve victim interests that majorities or strong interest groups embrace. Politics has brought meaningful reforms to prosecution for drunk driving, for example, and it has led to improvements, if still insufficient ones, regarding domestic violence and sexual assault crimes. But political accountability has not worked as well to remedy underenforcement when key victim groups have less public sympathy, or key defendant groups, such as police, have a lot. Redundant prosecution authority, in the form of federal oversight, has a similarly mixed track record. Federal law has done much to compensate for state underenforcement of public corruption offenses. It has made significant but less ambitious and successful commitments in the context of police violence. And federal authorities so far have attempted to reinforce state sexual assault enforcement only at the margins.

The track record of the U.S. responses to underenforcement, then, is mixed. But it is not clear that the alternative safeguards that predominate elsewhere are, on their own, clearly superior. Private prosecution is little use for victims with few financial resources or who are legally unsophisticated. Judicial review of declination can be exceedingly deferential, especially if statutes and regulations do not provide courts with clear criteria against which to assess prosecutorial decision making. Jurisdictions strongly committed to reducing unjustified declinations would combine most or all of these mechanisms. U.S. jurisdictions arguably have a history that should have made them especially likely to do so. States once permitted and relied on private prosecutions; judicial authority to review executive action, outside of prosecutor charging, is at least as robust here as in England; the movement for crime victim rights was as effective here as anywhere. The failure to devise more comprehensive safeguards suggests that certain specific pockets of underenforcement - involving police, marginalized victim groups, and sexual assaults - are especially hard to remedy, regardless of readily available solutions.

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Prosecution Service describes itself as "an independent prosecution authority." See About the Public Prosecution Service of Canada, Pub. Prosecution Serv. Can., *http://www.ppsc-sppc.gc.ca/eng/bas/dpp-dpp.html* (last updated Apr. 4, 2018). The Canadian Supreme Court affirms the prosecutor's wide discretion with reference to his political independence. See Krieger v. Law Society of Alta., [2002] 3 S.C.R. 372, para. 32 (Can.) ("The independence of the Attorney-General, in deciding fairly who should be prosecuted, is ... a hallmark of a free society." (quoting In re Hoem v. Law Soc'y of B.C. (1985), 63 B.C.L.R. 36 (Can. B.C. C.A.))).

[239] For a sample of longstanding criticisms of unregulated prosecutorial discretion, see Davis, supra note 123; Roscoe Pound, Criminal Justice in America 183 (1930) (criticizing the "intimate connection of the prosecutor's office with politics."); James Vorenberg, Decent Restraint of Prosecutorial Power, 94 Harv. L. Rev. 1521, 1554-60 (1981) (arguing that the scope of prosecutorial discretion is too broad). See generally Raymond Moley, Politics and Criminal Prosecution (1929) (criticizing political influence over prosecution).

From: CN=Anne Boyles/O=PalmBeach
To: Cheryl Kleen
Subject: Items for August 11 Town Council Meeting.
Date: Thursday, July 24, 2008 11:51:14 AM

FYI

----- Forwarded by Anne Boyles/PalmBeach on 07/24/2008 11:51 AM -----

From: Kathleen Ruderman/PalmBeach
To: Anne Boyles/PalmBeach@PalmBeach
Date: 07/24/2008 11:49 AM
Subject: Re: Items for August 11 Town Council Meeting.

Anne,

I have approved SPR 14-2007 and 5-2008. The Larkin item is OK. The appeal by Brindell re 144 Wells Road should not be on the agenda. The sod/seed item is an item that Tim Frank is working on but I don't think it's an agenda item. We need to check with Peter on that one. The infrastructure of large homes is not an agenda item. Neither is the Trump appeal for 515 North County Road.

Two things that will be added though are: EAR Amendments and Zoning Study Items.

TOWN OF PALM BEACH
POLICE DEPARTMENT
A NATIONAL AND STATE ACCREDITED LAW ENFORCEMENT AGENCY

CODE ENFORCEMENT BOARD MINUTES
2:00 P.M. THURSDAY, JULY 17, 2008
AT THE TOWN COUNCIL CHAMBERS, 360 S. COUNTY ROAD

I. **Call to Order**: The meeting was called to order at 2:00 p.m. by Chairman Timothy Hoffman.

II. **Roll Call:**

Present:	Timothy Hoffman, Chairman Harris Fried, Vice Chairman Larry Ochstein, Member Catherine M. Duemler, Member Madelyn Greenberg, Member Cynthia Van Buren, Member James M. Ballentine, Jr., First Alternate William P. Vanneck, Second Alternate
Absent:	Joel P. Koeppel, Member
Staff:	John Randolph, Town Attorney Captain Kirk Blouin, Support Services Rob Walton, Lead Code Enforcement Officer Nick Gerry, Code Enforcement Officer Bryant Weymer, Code Enforcement Officer Raychel Houston, Recording Secretary

III. **Approval of the Minutes of June 19, 2008:**

MOTION BY MS. DUEMLER FOR APPROVAL OF THE JUNE 19, 2008 MINUTES
MOTION SECONDED BY MS. GREENBERG
MOTION PASSED UNANIMOUSLY

IV. **Administration of the Oath to all persons who wish to testify:**

Let the record show that all persons wishing to testify were sworn in at this time by Recording Secretary Raychel Houston.

V. Public Hearings:

A. Case # 08-2431, 434 Seaspray Ave., Christopher Kaufman

Violation of Chapter 18, Section 18-242, Subsection 1 (104.1.1) of the Town of Palm Beach Code of Ordinances, building permits required to construct, install, repair or alter any building or building system.

Lead Code Enforcement Walton requested the case be postponed until a date certain of September 18, 2008 as Mr. Kaufman has a hearing before the Town Council.

MOTION BY MS GREENBERG TO POSTPONE THE CASE UNTIL SEPTEMBER 18, 2008
SECONDED BY MR. OCHSTEIN
MOTION PASSED UNANIMOUSLY

B. Case # 08-2511, 114 N. County Rd., Palm Beach Affair

Violation of Chapter 46, Section 46-68 of the Town of Palm Beach Code of Ordinances, annual fire and life safety inspection fees not paid

Code Enforcement Officer Gerry requested the case be dismissed as the fees were paid and it came into compliance.

MOTION BY MR. FRIED TO DISMISS THE CASE
SECONDED BY MS. GREENBERG
MOTION PASSED UNANIMOUSLY

C. Case # 08-2512, 235 Sunrise Ave., Suite C8, Palm Beach Resorts International

Violation of Chapter 46, Section 46-68 of the Town of Palm Beach Code of Ordinances, annual fire and life safety inspection fees not paid

Code Enforcement Officer Gerry presented the facts of the case and said the Town recommends a finding of non-compliance, administrative costs in the amount of $150.00 and payment of the fire inspection fee in addition to any late penalties by July 21, 2008. Mr. Hoffman inquired about the late penalties and Mr. Gerry said they were based on a monthly penalty of 10% per month. In response to Mr. Ochstein's question, Mr. Gerry explained that both the business and the property owner were cited. Mr. Fried inquired about service and Mr. Gerry said it was sent by certified mail. Mr. Ballentine asked if any attempts, other than by mail, were made to get in touch with someone at the business. Mr. Gerry said he went to the business, was told the owner was difficult to reach and left his business card but had not received any response.

MOTION BY MR. FRIED TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND ORDER THEM TO PAY THE FIRE INSPECTION FEE IN ADDITION TO ANY LATE PENALTIES BY JULY 21, 2008.
SECONDED BY MS. GREENBERG
MOTION PASSED UNANIMOUSLY

D. Case # 08-2513, 329 Worth Ave., Dunville L'Antiquaire, LTD
Violation of Chapter 46, Section 46-68 of the Town of Palm Beach Code of Ordinances, annual fire and life safety inspection fees not paid

Code Enforcement Officer Gerry presented the facts of the case and said he followed up after the certified letters were sent but the business could not be contacted. The Town recommends a finding of non-compliance, administrative costs in the amount of $150.00 and payment of the fire inspection fee in addition to any late penalties by July 21, 2008.

MOTION BY MS. GREENBERG TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND ORDER THEM TO PAY THE FIRE INSPECTION FEE IN ADDITION TO ANY LATE PENALTIES BY JULY 21, 2008.
SECONDED BY MS. VAN BUREN
MOTION PASSED UNANIMOUSLY

E. Case # 08-2514, 235 Sunrise Ave., C8, C.J.'s Simply Gourmet, Inc.
Violation of Chapter 46, Section 46-68 of the Town of Palm Beach Code of Ordinances, annual fire and life safety inspection fees not paid

Code Enforcement Officer Gerry presented the facts of the case and recommended a finding of non-compliance, administrative costs in the amount of $150.00 and payment of the fire inspection fee in addition to any late penalties by July 21, 2008. Mr. Gerry said he also tried, with negative results, to make contact with the owner of this business as it is the same owner as the other case at this location. Mr. Ochstein remarked that this was the same business which had been before the Board previously and had even "bounced a check" to the Town and wanted to know if there was something more that could be done other than the standard $150.00 costs. Mr. Gerry said he could review the case further to see if it could be brought back for additional fines. Mr. Hoffman asked if these cases were brought to Code Enforcement by the Finance Department and Mr. Gerry said they came from the Fire Prevention Bureau who handles their own billing and explained the procedure for that. Mr. Hoffman said it seemed like a year was a long time for these cases to be in arrears. Mr. Gerry said the cases were coming over quicker now from Fire Prevention and he thought it would improve in the future.

MOTION BY MR. OCHSTEIN TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND ORDER THEM TO PAY THE FIRE INSPECTION FEE IN ADDITION TO ANY LATE PENALTIES BY JULY 21, 2008.
SECONDED BY MR. FRIED
MOTION PASSED UNANIMOUSLY

F. Case # 08-2515, 140 N. County Rd., Bank of America
Violation of Chapter 46, Section 46-68 of the Town of Palm Beach Code of Ordinances, annual fire and life safety inspection fees not paid

Code Enforcement Officer Gerry presented the facts of the case and said he had spoken with Robin Gert who advised him the bill had been mishandled and gotten lost in their system. He said he spoke to her yesterday and was told the payment was still in process. The Town recommends a finding of non-compliance, administrative costs in the amount of $150.00 and payment of the fine inspection fee in addition to all late penalties and costs by August 4, 2008.

MOTION MADE BY MS. GREENBERG TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND ORDER THEM TO PAY THE FIRE INSPECTION FEE IN ADDITION TO ANY LATE PENALTIES BY AUGUST 4, 2008.
SECONDED BY MS. DUEMLER
MOTION PASSED UNANIMOUSLY

G. Case # 08-2516, 313 ½ Worth Ave., # B2, David Clark
Violation of Chapter 114, Section 114-32 of the Town of Palm Beach Code of Ordinances, business tax receipt required

Code Enforcement Officer Gerry presented the facts of the case and said Mr. Clark had submitted his paperwork and paid the fee but there was a zoning issue still in question. The Zoning Administrator is out of the office this week on jury duty and based on the inability to get the issue resolved, the Town recommends the case be postponed until the August 21, 2008 hearing date.

Mr. Fried questioned what the zoning issue had to do with a business tax receipt and Mr. Gerry said the Town records do not show this particular suite existing at this address but Mr. Clark has documents showing it there.

Mr. Gerry said zoning is tied into business tax receipts because zoning requirements do not allow certain businesses in some districts. There is also the question of whether the space is legitimate because people will subdivide suites and make two spaces where there should only be one. Mr. Gerry said it looked like a legal space from the documentation Mr. Clark provided but the Zoning Administrator needed to approve it.

MOTION BY MR. FRIED TO POSTPONE THE CASE UNTIL AUGUST 21, 2008
SECONDED BY MS. VAN BUREN
MOTION PASSED UNANIMOUSLY

H. Case # 08-2517, 2270 E. Ibis Isle Road, Mark Remson Trust
REPEAT Violation of Chapter 42, Section 42-86 of the Town of Palm Beach Code of Ordinances, Environment, properties to be maintained in a good condition.

Code Enforcement Officer Weymer presented the facts of the case and said the violation was discovered from routine patrol in the area but shortly after the notice of repeat violation was sent out, a citizen complaint was received as well. Mr. Weymer said there had been at least seven previous letters to this property owner regarding lack of maintenance on the property. A repeat notice of code violation was mailed out on June 24, 2008 with a mandatory hearing date. The lot was cut on or around July 2, 2008. This particular violation is a Class II violation under the fine schedule which calls for a fine of $400.00, however, by law, the Board has the ability to impose a fine of up to $500.00 because it is a repeat violation. Mr. Weymer said he believes it is important to look at the track record of this property in considering the fine. The Town recommends a finding of non-compliance, administrative costs in the amount of $150.00 and a fine of $500.00, which is the maximum fine for a repeat violation.

Mr. Hoffman said it seemed that every time the property owner gets notified he comes into compliance but he has to be notified. Mr. Weymer says there are times when he comes into compliance but on at least two other occasions, he has been before the Board because he has not complied by the time set. Mr. Ochstein asked if he has been fined in the past and Mr. Weymer said there are two outstanding fines for which liens have been placed on the property.

MOTION BY MS. GREENBERG TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND A FINE OF $500.00
SECONDED BY MS. DUEMLER
MOTION PASSED UNANIMOUSLY

I. Case # 08-2518, 230 Esplanade Way, Kenneth J. Horton

Violation of Chapter 42, Section 42-86 (19) of the Town of Palm Beach Code of Ordinances, cleared land must be re-sodded or replanted to prevent the creation of windblown dust or dirt and Chapter 42, Section 42-86, unsightly, unsafe or unsanitary conditions not permitted and properties to be maintained in good condition.

Code Enforcement Officer Weymer presented the facts of the case and said the violation was discovered on routine patrol. Mr. Weymer has been in contact with a property representative, Louis Pascerelli who said Mr. Horton had not been in Town to receive his mail. Mr. Weymer said Mr. Pascerelli had proposals from Hansen Landscape for the clean up and re-sod of the lot and a weekly maintenance contract to assure this does not happen again. Tropical Irrigation has also been contacted to put in a new irrigation system. The Town recommends a finding of non-compliance, administrative costs in the amount of $150.00 and the property owner be given until August 18, 2008 to come into compliance. Mr. Fried said he believed a fine of some sort should be imposed. Mr. Ballentine asked how long Mr. Horton had been out of compliance. Mr. Weymer said the original warning was sent on June 5, 2008 and a notice of violation and hearing was sent on June 20, 2008. Mr. Weymer said the first contact with the property owner was July 7, 2008. Mr. Ballentine asked if the August compliance date was reasonable and Mr. Weymer said Jim Hansen of Hansen Landscape thought the work would be done before that date but wanted more time in case he ran into any problems.

MOTION BY MR. FRIED TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND GIVE HIM UNTIL AUGUST 18, 2008 TO COME INTO COMPLIANCE.
SECONDED BY MR. OCHSTEIN
MOTION PASSED UNANIMOUSLY

J. Case # 08-2519, 206 Dunbar Road, AMF Estate Management

Violation of Chapter 42, Section 42-230 of the Town of Palm Beach Code of Ordinances, leaf blower over 65dBA at 50 ft.

Code Enforcement Officer Weymer presented the facts of the case and said he witnessed the violation on June 26, 2008. AMF had previously been warned on February 19, 2008 for using a leaf blower over 65dBA. Mr. Weymer performed a decibel test for this violation and the reading was 79.6 dBA at 50 feet. This is a class II violation under the fine schedule which has a $125.00 fine for the first offense. The violation was issued on site to a superintendant for AMF and has not been paid. The Town recommends a finding of non-compliance, administrative costs in the amount of $150.00 and payment of the $125.00 fine.

Mr. Hoffman asked whether this company had participated in the leaf blower testing being offered by Code Enforcement. Mr. Weymer said AMF had participated in the testing program and had several leaf blowers certified. He said

the truck he was out with had 2 other leaf blowers on the truck that he could identify as being over 65dBA but he only tested the one they were using and wrote a violation for that one. Ms. Van Buren asked about the testing method and Mr. Weymer explained how it was done.

MOTION BY MR. OCHSTEIN TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND ORDER HIM TO PAY THE $125.00 FINE
SECONDED BY MS. VAN BUREN
MOTION PASSED UNANIMOUSLY

K. Case # 08-2520, 165 Brazilian Ave., Richard Lynn

Violation of Chapter 10, Section 10-45 (i) of the Town of Palm Beach Code of Ordinances, if any dog attacks and causes severe injury or death to any human or domestic animal more than once, the owner shall be required to have said dog removed from the Town or humanely euthanized at his/her sole expense and violation of Chapter 10, Section 10-6 of the Code which prohibits animals from creating nuisances which are detrimental to the public safety and welfare.

(Mr. Ochstein recused himself, stating that he has a relative who has a business relationship with Dr. Lynn and Mr. Hoffman advised Mr. Vanneck would be a voting member in this case)

Sgt. Curtis Krauel said this case was brought to Code Enforcement through a culmination of events spanning back over a period of 4 years. Sgt. Krauel explained Section 10-6 of the Code and said he was going to be showing some graphic photographs. Sgt. Krauel presented the facts of each of the documented cases involving attacks by Duke from March 17, 2004 until May 11, 2008.

Mr. Hoffman questioned how the Code Enforcement Board came into this procedure since the Town Council had already said Duke is a dangerous dog. Mr. Randolph explained that Town Council does not have the authority to fine. Originally, the police department did not issue a code enforcement board citation but ordered the dog be removed from the Town or humanely euthanized which was appealed to Town Council. Town Council denied the appeal. Since that time, Dr. Lynn has refused to comply with the order of the Town Council so a citation was issued by Code Enforcement to bring the matter before the Board to determine whether there should be a finding of violation and at a later time, whether a fine should be imposed. Mr. Randolph said it was now the jurisdiction of the Code Enforcement Board and not the Town Council. Mr. Hoffman questioned whether or not the Board had to determine if the dog was going to be euthanized or removed from the Town and Mr. Randolph explained that this was not the Board's determination. The Board was only to determine whether or not there had been a violation of the Town Code.

Sgt. Krauel continued his presentation remarking that once Duke had been found “potentially dangerous” by Animal Care and Control, there had been another attack but due to an administrative error by Animal Care and Control in failing to document their records appropriately, Duke was classified as “potentially dangerous” again. This is an error that Animal Care and Control completely acknowledges.

After the last attack on May 11, 2008, Duke was taken into custody by Animal Care and Control and after a hearing, was classified as “dangerous”. Sgt. Krauel noted that the hearing before Special Magistrate Earl Mallory did not classify Duke as vicious because Duke had no documented cases of attacks on humans. After this last case was reviewed by Code Enforcement, sufficient evidence was also found by the Town to classify Duke as dangerous and Dr. Lynn was notified by registered mail. Dr. Lynn appealed to Town Council and that appeal was denied by Town Council by a 5-0 vote. The Town recommends a finding of non-compliance with Chapter 10, Section 10-6 as the Town has the two required affidavits of residents of the Town occupying separate households. The Board was provided with copies of four (4) affidavits.

Sgt. Krauel then proceeded with an explanation of Chapter 10, Section 10-45 and said the Town was requesting a separate motion for a finding of non-compliance of Chapter 10, Section 10-45 (i) and that Dr. Lynn be given until July 18, 2008 to come into compliance by either removing the dog from the Town or having it humanely euthanized. If compliance is not achieved, the Town recommends a daily fine of $250.00 a day commence on July 19, 2008 and continue until compliance is achieved.

Mr. Randolph requested the Board treat these two sections of the Code separate and apart. He said the first evidence heard related to Section 10-6 (3) and involved the affidavits from the residents of the Town. Because of the dispute Dr. Lynn’s attorney has with regard to the manner that Section 10-45 was applied, Mr. Randolph recommended the two Code sections not be mixed up. Mr. Randolph said he would like for the Board to first consider whether there had been a violation of 10-6 and to make a motion one way or the other with regard to the Staff’s recommendation. He then requested that Section 10-45 be entertained separately after Dr. Lynn’s attorney and anyone else who wanted to speak had an opportunity to do so.

Vivian Dorris, 155 Brazilian Ave., said her beagle/bassett, Charlie, was viciously attacked by Dr. Lynn’s dog, Duke and she has sustained approximately $8500 in vet’s bills. She said her dog will never walk properly again because of severe nerve damage. She does not feel there are enough precautions being taken for the safety of residents on Brazilian Ave. She asked that the Board take this into consideration and thanked them for their service.

Wayne Gerl, 149 Brazilian Ave., said he has two dogs and every time he exits his driveway or front yard, he has to stop and peek around and make sure the other dogs are not in the area. He said he was bitten by Duke a couple of years ago. He was talking with Dr. Lynn and the dog just reached out and bit him, tearing his pants and breaking the skin. He said he has been friends with Dr. Lynn and Margrit for many years but it was just unsafe for anybody and any animals in the area.

Bobby Goodnough said he was jogging in the area and the dog lunged at him, causing him to have to dive through a 12 foot hedge to get away from it. He said he just thought it was a matter of time before the dog got a person or a child. Sgt. Krauel asked if Mr. Goodnough had reported the incident to the police department or had a time frame of occurrence. Mr. Goodnough said he had not made a police report but it occurred about 2 years ago.

Laura Klein, 130 Seaspray Ave., said she had lived here for 12 years, having moved from Washington, D.C. for a sense of security. She said she was now in the process of installing surveillance cameras. She said she could no longer walk her dog without constantly looking around, worrying if Duke had once again escaped from the open gates. She said it is a privilege to own a dog and dog ownership and responsibility should go hand in hand. She said Dr. Lynn was issued a citation in August of 2002 for locking his dog in a car with the windows rolled up. She said she mentioned this to prove his irresponsibility. She said his voluminous file from Animal Care and Control would attest to this. She said no one was safe while Duke is in Palm Beach.

James Merola was present on behalf of Dr. Lynn and said he was present on a revised Notice of Code Violation and Hearing dated July 15, 2008. He said he was not denying there were incidents with Duke. Palm Beach County had the dog taken into custody and the hearing was held June 5, 2008. At that hearing, it was agreed upon by the County and Dr. Lynn that the dog would be classified as dangerous. The dog was classified as dangerous which required certain restrictions on the dog which Dr. Lynn complied with and the dog was returned to him. In the event Duke has another incident, pursuant to state and county law, but some reason not Town law, the dog would be taken into custody and euthanized. Mr. Merola said Dr. Lynn feels very badly about the situation and agreed with the County to do what they required. Mr. Merola said Dr. Lynn then received a letter, dated June 16, 2008 from the police department, mentioning the order of the County and stating for the first time that the Town was declaring the dog dangerous and giving him ten (10) days to appeal, which he did not. On June 20, 2008, 4 days after the dog was declared dangerous by the Town, the police department sent a second letter, citing 10-45 (i), advising that since the dog already had two incidents, they wanted it removed or euthanized. The dog had not done anything since being declared dangerous. This letter did not mention an appeal, but he sent a letter anyway, stating they did not agree with that. He said the dog was declared dangerous on June 16th, requirements were imposed and they complied with those, including the filing of a $1000 bond and they did not agree the dog should now be removed. There was a Town Council hearing on August 8th and the Council said they needed to have the dog removed or euthanized. Mr.

Merola went into detail about the requirements of 10-45 and said Dr. Lynn had complied with all of those. Then the letter of June 20th came, requiring Dr. Lynn to remove the dog or euthanize it. Mr. Merola read subsection (h) into the record and said the Code Enforcement Board did not have any jurisdiction over subsection (i) as subsection (h) just mentioned (d) through (g). The Town filed a lawsuit and he and Mr. Randolph were before Judge Hoy this morning. The Town is asking to have the dog removed or euthanized and asking for a permanent injunction, stating an emergency situation. Judge Hoy gave them a hearing at 1:30 p.m. on Tuesday where it will be determined whether the dog is a nuisance, whether 10-45 (i) even applies to the situation and if the Board has authority over 10-45 (i). If the Judge says the dog has to go, they are not going to argue with the Court but he believes they have a right to present their case. He does not believe the Town's position that the fine should start tomorrow is correct. He believes the Board can only find violations of subsections (d) through (g) of 10-45. There have been no allegations that Dr. Lynn has violated subsections (d) through (g). Mr. Merola believes it is clear that the Code Enforcement Board has no authority under (i). Mr. Merola then addressed 10-6 and said he believed that since all precautions have been taken under 10-45, the dog does not constitute a nuisance. Mr. Merola said he has an injunction relief request before the Judge to stop the Board from making this decision. Mr. Merola said Mr. Randolph has asked them to determine these two (2) ordinances separately and he does not believe 10-45 (i) is in the Board's purview, and as to the nuisance, the dog has to be a nuisance now and it is not. This is all going to be determined Tuesday and he is asking the Board to either deny the Town's recommendation because the Town cannot prove the dog is a nuisance now or reset this case until next month's hearing.

Sgt. Krauel advised he wanted to make a rebuttal to some of Mr. Merola's comments. The service of notice Mr. Merola referred to in declaring the dog dangerous was when the police department spoke with Dr. Lynn on June 12, 2008 and was told Duke was being housed at a kennel in Palm Beach County. A notice could not be served to Dr. Lynn to have him come into compliance with something he was already in compliance with. The dog was not in the Town. The police department did not find out the dog was in Town until June 20th when Laura Klein reported the dog attempted to break free of Dr. Lynn to attack her and this is when the letter was sent out requesting compliance with Section 10-45. Dr. Lynn was given the entire ordinance on June 10th, not just sections or specific acts that he needed to comply with. Duke was not on the property at that time and no notification to remove the dog from the property could be served then because the dog was not there. As far as the police department was concerned, Dr. Lynn was in compliance with the ordinance. Sgt. Krauel pointed out that the Town does not abide by the state and the county ordinances, that the Town has the ability to enforce more stringent and strict ordinances and that is what we have done here.

Sgt. Krauel said he was prepared, based on Counsel's recommendation, to recommend a motion to find Dr. Lynn in non-compliance with Section 10-6 and move to postpone 10-45 (i) until after further consideration by the Circuit Court on Tuesday. The Town recommends administrative costs in the amount of

$150.00 and a fine of $250.00 a day to start on June 19, 2008 if compliance is not achieved by June 18, 2008.

Mr. Ballentine asked for clarification on the motion and was advised by Mr. Randolph that it would be a finding of non-compliance of Chapter 10, Section 10-6, administrative costs of $150.00 and a compliance date of July 18, 2008 with a fine to be considered at the next meeting if compliance was not achieved.

Ms. Duemler said she believed that the dog, besides being a nuisance, is a threat to society and she hoped that by Tuesday the dog did not break loose from Dr. Lynn and maul some child, that she believed it is a disgrace and she supports the Town.

(*applause from the audience)*

MOTION BY MR. FRIED TO FIND DR. LYNN IN VIOLATION OF CHAPTER 10, SECTION 10-6, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND REQUIRE HIM TO COME INTO COMPLIANCE BY JULY 18, 2008
MOTION SECONDED BY MR. BALLENTINE
MOTION PASSED UNANIMOUSLY

Mr. Randolph asked if a motion could be made to defer the consideration of violation of Chapter 10, Section 10-45 (i) until the August 21, 2008 meeting and Ms. Greenberg advised she would make that motion. Mr. Fried asked Mr. Randolph if he would explain the reason for this. Mr. Randolph said the argument had been made that 10-45 should not apply because the dog has already been deemed dangerous by the County and pursuant to the Town's Code. Mr. Randolph said he believed the argument was going to be made in court on Tuesday that it is not appropriate for the Town to move forward with regard to 10-45 (i) because that only applies to any incident that occurs after the dog has been declared dangerous. The argument has been made that Dr. Lynn has done everything he is required to do. Mr. Randolph said he hesitated to explain further if the matter was going to be deferred. Mr. Randolph said the position of Staff is that item (i) stands on its own merits, that it is not connected to 10-45 (a) through (h). It is also the position of Staff that it is appropriate to bring a violation of (i) to the Code Enforcement Board even though it does not specifically state that in 10-45 because Section 2-439, which is the citation fine schedule, sets forth all of the sections of the Code of Ordinances which can be brought before the Code Enforcement Board and 10-45 is listed. Code Enforcement has the right to bring a violation directly to the Code Enforcement Board instead of issuing the fine set forth in the fine schedule. Mr. Randolph said the Board could move forward in considering 10-45 instead of deferring it to the next meeting.

Mr. Fried commented that based on the egregious nature of what they had been presented with, he believed the Board should do everything they could to put pressure on Dr. Lynn to comply. Mr. Randolph questioned whether the Town would be requesting a separate fine of $250.00 a day for non-compliance and Sgt. Krauel said that was his recommendation, that there would be two concurrent fines running. Mr. Hoffman asked about the administrative costs and Sgt. Krauel said the Town was only asking for one.

MOTION BY MR. FRIED TO FIND DR. LYNN IN VIOLATION OF CHAPTER 10, SECTION 10-45 (i) AND REQUIRE HIM TO COME INTO COMPLIANCE BY JULY 18, 2008
SECONDED BY MS. GREENBERG
MOTION PASSED UNANIMOUSLY

Mr. Merola questioned what the order was with regard to 10-6, if it was to have the dog removed or euthanized by Friday or just to abate the nuisance. He said he needed to know what to tell Dr. Lynn what had to be done by Friday to avoid the potential fine. Mr. Hoffman said Dr. Lynn needed to either remove the dog or have it euthanized and Mr. Fried said that was his intention in making the motion.

VI. Old Business:

A. Case # 08-2484, 515 N. County Road, Trump Properties, LLC
Violation of Chapter 18, Section 18-205 of the Town of Palm Beach Code of Ordinances, the Architectural Commission may attach conditions to any approval it grants.

Lead Code Enforcement Officer Walton advised this case would be heard at Town Council on August 11, 2008 and requested the case be postponed until the August 21, 2008 hearing date. Mr. Trump's attorney and the attorney for the new purchaser were both present.

Robert Brody said he was the attorney for County Road Property LLC, who had just purchased the property two days ago. He said it was the intent of his client to comply with the Town and also to work with the Town. There is an appeal pending and Mr. Brody said it was his client's intent to work everything out with ARCOM prior to that appeal. He said he had recommended to his client that he withdraw the appeal. Mr. Brody said his client had hired the Lawrence Group and Gene Lawrence planned to work with ARCOM.

MOTION BY MS. DUEMLER TO POSTPONE THE CASE UNTIL AUGUST 21, 2008
SECONDED BY MS. VAN BUREN
MOTION PASSED UNANIMOUSLY

VII. Fine Consideration:

A. Case # 08-2432, Beachfront Vista Property, Nightingale Beach Club Association
Violation of Chapter 134, Section 134-1472 (3) of the Town of Palm Beach Code of Ordinances, no additional walls, fences, hedges or other structures or growth shall be erected or be grown eastwardly of Ocean Boulevard to a height greater than four (4) feet above the surface of the Ocean Boulevard.

(Ms. Duemler recused herself as part of a previously declared conflict and Mr. Hoffman advised Mr. Vanneck would be a voting member in this case)

Lead Code Enforcement Officer Walton said Nightingale Beach Club had previously been found in violation and was given time to obtain a permit. A permit was obtained but there were some conditions attached to it. There have been two inspections with the Florida Wildlife Commission and an agreement was reached to not require the vegetation to be trimmed until after turtle season. Since they have already been found in non-compliance, the Town recommends the time for compliance be extended to November 7, 2008 and if compliance is not achieved by that date, a fine of $250.00 a day be imposed.

Jack Maxey, 244 Nightingale Trail, presented some documents to the Board and advised he was president of the Nightingale Trail Beach Club Association. He said one of the documents was his application under duress for the permit. Mr. Maxey advised he had not been sworn in and was administered the oath of office by Recording Secretary Houston.

Mr. Maxey said he has had a long correspondence with the legal department of the Department of Environmental Protection and he believes on an emotional level, they do not believe the trees should come down but they told him they could not find any statutory way to force the Town not to enforce the permit. They told him it should be the jurisdiction of a court, not the DEP. Mr. Maxey said the Town was cutting down its own sea grapes in violation of the permitting process. Mr. Maxey said there were all kinds of burdens in this permit he needed to comply with, one of which was replacement of the whole plant if anything over 6 feet tall which was larger than 3 inches in diameter was cut down. He said he was supposed to provide a signature on the document putting himself at risk of a $10,000 a day fine if he did not comply with the requirements of the permit. Mr. Maxey said Jean Higgins, a biologist for the State Fish & Wildlife, recommended sea grapes should not be trimmed because they are the best source of protection against the lighting. Ms. Higgins made some suggestions such as changing light fixtures and extinguishing lights during turtle season and maintaining a substantial healthy vegetation light blocking buffer.

Mr. Maxey said an approximate 24 inch piece of aluminum is hanging from the light on Nightingale Trail and it seemed highly unusual that a shield of that nature would only be necessary on that light when the recommendations given by Fish & Wildlife are recommendations with broad reaching impact for the entire island. He noted that the street lights in Palm Beach do not go off during turtle nesting season. He said a field permit for trimming of the sea grapes at the Nightingale Beach Club Association was not recommended during the nesting season. He said the indifference to materials he had brought forth more than a year ago that had now been brought forth officially by the DEP were offensive to him and that is one of the reasons he had continued to "hammer" this. He said he believed the Board should recommend to the Town Council that they remove this section of the Code, given the current environmental regime, especially when one considers the public relations downside of fighting him on this issue and spending $2,000,000 to fight Lake Worth on the other side. Mr. Maxey said this was probably not a win-win situation and that NOAA had not even been brought into the fold yet.

Mr. Ochstein wanted to know if the Board was precluded from enforcing the ordinance now. Mr. Walton said it should not be enforced now, that in speaking with Mr. Wettstein from DEP and Ms. Higgins from FWC, an agreement had been reached to wait until the end of turtle season to require the trimming. The Town recommends granting the Nightingale Beach Club until November 7, 2008 to come into compliance. The permit is good until that date. In response to Mr. Hoffman's question, Mr. Walton said the permit was issued on June 16, 2008. Mr. Maxey said he applied on March 19, 2008. Mr. Balletine inquired as to whether 7 days was sufficient for compliance after the end of turtle season and Mr. Walton said it was not a large area and he believed it was. Mr. Maxey said he did not believe it was sufficient, that it would be an economic hardship if he had to replace every tree that is over 3 inches in diameter in order to get it below 6 feet and he brought up other issues involved with the trimming. Mr. Balletine told Mr. Maxey he just wanted to know, without going into a lot of detail, whether he could comply in a 7 day period.. Mr. Maxey said that before he could remove any native plant, he had to first remove every single non-native one from the property and he had some questions whether or not he could comply within that time period. He also said he had some real questions about whether the law, both at the State and the local level, had been equally applied within the Town. Mr. Maxey said he is in consultation with an attorney to find out what measures he can take. The Town did not apply for a permit to cut its own sea grapes and judging from the guidelines he has in his permit, the Town would be in violation of almost everyone of those guidelines. The DEP counsel's office asked him to provide photographs of the Town's illegal cutting back in February.

Mr. Vanneck said there should be more research as to what should and should not be cut. He believes the Town code may have gone too far.

Mr. Hoffman said the Board did not have the authority to modify the Code and could only enforce the Codes as they had been written.

MOTION BY MR. OCHSTEIN TO GRANT THE VIOLATOR UNTIL NOVEMBER 7, 2008 TO COME INTO COMPLIANCE AND IF COMPLIANCE IS NOT ACHIEVED BY THAT DATE, TO ASSESS A FINE IN THE AMOUNT OF $250.00 A DAY UNTIL COMPLIANCE IS ACHIEVED SECONDED BY MR. BALLENTINE

Mr. Vanneck asked for clarification on what the motion was and Mr. Walton advised the motion was that the sea grapes must be cut after turtle season, by November 7, 2008 and if they were not cut by that date, a $250.00 a day fine would commence on November 8, 2008 and continue until compliance was achieved.

Mr. Fried asked who the fine would apply to and Mr. Walton said it would be to the Nightingale Trail Beach Club Association. Mr. Fried asked if this was a legally constituted body and Mr. Maxey said it was an informal body, that on the deeds, everyone owns this piece of property in common. There was some additional discussion on the ordinance. Ms. Van Buren asked if every single property owner on the street was a member of the association and Mr. Maxey said every property owner on Nightingale Trail was and there were one or two houses on North Ocean and North Lake as well. Mr. Maxey said there were 23 separate memberships. Ms. Van Buren asked about the finances and Mr. Maxey said there were annual dues of $75.00 a year and a common bank account of $3500 or $3600. Mr. Maxey said that if a fine was incurred, that is probably where the money would come from but he did not believe, because of his fiduciary responsibility to the group, he could fight the decision with any of those monies. Mr. Ochstein asked if he was an elected officer and Mr. Maxey said he was president and that he keeps the books and makes sure the place is in good condition.

MOTION BY MR. OCHSTEIN TO GRANT THE VIOLATOR UNTIL NOVEMBER 7, 2008 TO COME INTO COMPLIANCE AND IF COMPLIANCE IS NOT ACHIEVED BY THAT DATE, TO ASSESS A FINE IN THE AMOUNT OF $250.00 A DAY UNTIL COMPLIANCE IS ACHIEVED
SECONDED BY MR. BALLENTINE
MOTION OPPOSED

ROLL CALL VOTE:

MR. OCHSTEIN	**YES**
MR. BALLENTINE	**YES**
MR. FRIED	**YES**
MS. GREENBERG	**YES**
MS. VAN BUREN	**YES**
MR. VANNECK	**NO**
MR. HOFFMAN	**YES**
MOTION PASSES	**6-1**

Mr. Fried advised Mr. Maxey that the Code Enforcement Board's position was to enforce the Code and said that he had always found the Town Council members to be very receptive, individually and as a group. Mr. Fried said it was not beyond the Town Council's power and authority, if persuaded, to look into an ordinance and suggested Mr. Maxey address it with them.

B. Case # 08-2508, 227 Brazilian Ave., 2F, Hillen J. Smith

Violation of Chapter 18, Section 18-241 of the Town of Palm Beach Code of Ordinances, building permits required to construct, install, repair or alter any building or building system

Lead Code Enforcement Officer said Mr. Smith was found in violation, assessed $150.00 in administrative costs and given until July 16, 2008 to come into compliance. Compliance has not been achieved so this is the time a fine would be assessed. Mr. Walton said the contractor was present to speak.

Steve Pappanelli said he was hired by Mr. Smith after Mr. Smith had been cited and he was 90% complete with the job. He was just waiting on his final inspection and he should have it by next week but the building is closed to all construction inspections for two (2) weeks. Mr. Pappanelli said he was present on Mr. Smith's behalf to request a three (3) week extension. Mr. Walton said the Town did not oppose the extension of time. Mr. Walton said the three weeks was necessary because the building would not let inspections be done while their maintenance man was on vacation. Mr. Walton said if compliance was not achieved by August 7, 2008 then he would ask for a $250.00 a day fine to commence on August 8, 2008.

Ms. Greenberg asked some questions about the type of permits and remarked that it is unfortunate in multi-family dwellings that this type of situation would exist to begin with because electrical and plumbing can have catastrophic effects on other owners. She said it is unfortunate the people do not do the right thing until they get caught. Mr. Pappanelli said he was not the contractor working without permits.

MOTION BY MR. OCHSTEIN TO GRANT AN EXTENSION OF TIME UNTIL AUGUST 8, 2008 TO COME INTO COMPLIANCE AND TO ASSESS A FINE OF $250.00, RETROACTIVE TO JULY 17, 2008 IF COMPLIANCE WAS NOT ACHIEVED
SECONDED BY MS. GREENBERG

During discussion on the motion, Ms. Duemler stated she believed the retroactive fine was a little harsh. Mr. Ballentine said he agreed and asked the reason for the retroactive fine. Mr. Ochstein said there are so many people who do work without a permit and they know they need a permit. That is a very dangerous thing in a multi-family dwelling and it should be egregious.

MOTION BY MR. OCHSTEIN TO GRANT AN EXTENSION OF TIME UNTIL AUGUST 8, 2008 TO COME INTO COMPLIANCE AND TO

ASSESS A FINE OF $250.00, RETROACTIVE TO JULY 17, 2008 IF COMPLIANCE WAS NOT ACHIEVED
SECONDED BY MS. GREENBERG
MOTION PASSED UNANIMOUSLY

VIII. Fine Reduction:

A. Case # 08-2301, 167 E. Inlet Drive, The Landfall Group,
Violation of Chapter 18, Section 18-242, Subsection 104.5.1.6, medium projects, all new or remodel construction projects 4000 sq. ft, to 8,999 sq. ft. under roof be allowed 22 months

Lead Code Enforcement Officer Walton said in October, 2007, Ajax Equity LLC was found in violation of going over the construction time limits. On November 15, 2008 they still were not in compliance and a daily fine of $250.00 started running. The final inspection was obtained in March, 2008. The fine ran for 137 days prior to compliance being achieved and the accumulated fine due is $34,250.00 and the $150.00 hearing costs have not been paid.

Frank Lynch advised he was the attorney for both The Landfall Group and Ajax. He said when they appeared before the Board in October, Lazslo Wagner, the principal of The Landfall Group, who has built homes throughout the Town of Palm Beach for 26 years acknowledged he was unaware of this particular code provision. Had he been, they would have applied for an extension of time to complete the construction. At the hearing, Mr. Koeppel made a motion to allow them an additional sixty (60) days to complete the construction, find them in non-compliance and assess the $150 costs. After a significant amount of discussion, that motion went to a vote and failed 4-3. A second motion was made and Ms. Duemler thought the $250.00 fee was significant and believed the fine should be $125.00 a day. Mr. Lynch gave Mr. Walton a copy of that transcript to put in the record. As part of their request, they are asking the Board to consider what Ms. Duemler suggested at the meeting. At the same time, Mr. Lynch said he would like them to consider that The Landfall Group is a good corporate citizen and made a legitimate mistake. As a result, a fine was incurred and they are willing to accept some level of fine, some level of responsibility for what they did. The construction was continually on going, there were no delays other than the construction process itself. This was not someone’s house, it was a speculative venture. There had been some concerns with the shell contractor and the finish items themselves were significant enough that there were substantial delays. At that same hearing, Code Enforcement Officer Gerry said it was the position of Code Enforcement to get more assertive at the suggestion of Town Council and that these projects were to be more aggressively pursued. Under the new ordinance, for a house of approximately 5,000 sq. feet, they would be entitled to 24 months. This would have brought them to November 2007 and they would have gotten additional time for Hurricane Wilma which would have brought them to December. If they were under the new Code, they would not be before the Board today and may not have a fine at all. He realizes a mistake was made, he realizes something has to be paid but he thinks $35,000 is a significant fine. The Board has gotten their attention and they would ask for a significant reduction in the fine.

Mr. Fried asked how long it took to get the final inspection after the 22 months had run. Mr. Walton said they had been given 23 months due to the hurricanes and they were 5 months and 9 days beyond that. Mr. Ballentine asked how far out they would be under the new rules. Mr. Walton said they would be given 24 months which with the hurricane would be 25 months. Mr. Lynch said that at the end of that 24 month period, if they had not sought an extension of time within the required time period, no earlier than 6 months and no later than 45 days, before the expiration of that 24 months, their project would have been shut down. Mr. Wagner's lack of knowledge of this particular situation would have become irrelevant because they would have been red tagged on the next day after the 24 month period. Mr. Lynch said Mr. Wagner did not know because he has been a good corporate citizen and had never been before the Board except on one occasion which was beyond his control; it was a maintenance item on the Glazer house. Mr. Walton said that situation was not due to Mr. Wagner's fault, that he was just representing the owner.

Mr. Ballentine asked how Mr. Wagner did not know the Code requirement if he had built so many homes in the area and said he had difficulty with the ignorance of that.

Mr. Fried said he agreed with Mr. Ballentine and found it hard to believe that Mr. Wagner did not know the time limits. He said some reduction should be considered but he was not sure on what basis.

Mr. Ochstein remarked that the fine was around $35,000 and the house was on the market for $10.6 million dollars so he did not see the hardship. Mr. Lynch said he did not know the price but he would accept Mr. Ochstein's statement on that. Mr. Lynch said the hardship was in the imposition of the fine itself, there were mistakes made and he believed that Council would have given them a significant extension of time if Mr. Wagner had been aware of the situation and filed the proper notice with Town Council.

Mr. Lynch said if some sort of arrangement could be reached today, his client would be in a position to pay within the next two weeks. Mr. Hoffman said he was concerned because he believed that when the case was originally heard, they had the option of fining $250.00 a day and they gave them a fine reduction at the time they initiated the fine of $125.00 a day. Mr. Walton corrected Mr. Hoffman, advising there was a motion for a fine of $125.00 a day which failed and the fine that was in effect was $250.00 a day. Mr. Lynch said he believed the record reflects something different than that. Mr. Walton said his records reflect $250.00

a day but he would review it. Mr. Walton reviewed the transcript and noted that it showed $125.00 a day but the Board order specified $250.00 a day and he would have to do further research.
Mr. Fried advised he could make a motion to postpone the matter to the next meeting and have Mr. Walton bring back the correct information. There was additional discussion about the amount of the fine and Mr. Lynch said he was seeking a reduction of the $17,125.00 which would be the amount of the fine if it was $125.00 a day. Mr. Hoffman said he would find that hard to accept. Mr. Hoffman read from the minutes that a motion was made by Mr. Fried that the defendant was found in non-compliance, ordered to pay an administrative fee in the amount of $150.00, obtain a final building inspection by October 25, 2008 and a fine of $125.00 to commence on October 26, 2007. He said that motion passed 4-3. Mr. Walton said he could not dispute that but he would have to do some research. Mr. Hoffman said he would not be in favor of reducing the $17, 125.00 any further.

Mr. Ochstein said he was hesitant to do anything until they know what the number is. Mr. Walton suggesting postponing the case until next month.

MOTION BY MR. OCHSTEIN TO POSTPONE THE FINE REDUCTION HEARING UNTIL AUGUST 21, 2008
SECONDED BY MR. FRIED
MOTION OPPOSED

ROLL CALL VOTE:

MR. OCHSTEIN	**YES**
MR. FRIED	**YES**
MS. DUEMLER	**YES**
MS. GREENBERG	**NO**
MS. VAN BUREN	**NO**
MR. BALLENTINE	**YES**
MR. HOFFMAN	**NO**
MOTION PASSES	**4-3**

B. Case # 08-2302, 9 Via Vizcaya, Macari Building & Design, Casa Picchio, LLC
Violation of Chapter 18, Section 18-242, Subsection 104.5.1.6, medium projects, all new or remodel construction projects 4000 sq. ft, to 8,999 sq. ft. under roof be allowed 22 months

Lead Code Enforcement said the property was found in non-compliance and they requested a fine reduction hearing. The owner of the property was called out of town and they requested a postponement until the August hearing.

MOTION BY MS. GREENBERG TO POSTPONE THE FINE REDUCTION HEARING UNTIL AUGUST 21, 2008
SECONDED BY MS. VAN BUREN
MOTION PASSED UNANIMOUSLY

IX. Comments:

Ms. Greenberg said that the presentation using the "slides" made it too dark in the room. She wanted to know if there was anything they could do as a Board in making a suggestion to the Council about an ordinance that could address people not pulling permits because of the safety issues in terms of multi-family dwellings. Capt. Blouin said there was a provision in place. If work is done without a permit, there is a penalty involved. There was an ordinance drafted last year that requires them to pay four times the permit fee.

Mr. Fried asked Mr. Randolph if he had spoken to Mr. Elwell about the foreclosure action being brought to the Board's area of responsibility as opposed to the Town Council. Mr. Randolph said he had but did not have an answer yet and would try to get one. Mr. Fried asked Ms. Houston about progress on the fines and she said the Town was now inputting fines into the computer system and if someone had outstanding fines they could not get any permits. People are contacting Code Enforcement because they cannot get permits and are either paying or asking to come back to the Board for a fine reduction.

Capt. Blouin advised that with regard to any foreclosure action, the police department is scrutinizing each and every one of them as some of these cases we have liens on were pre-existing prior to coming to the police department. We do not want to bring a case to the board that can be handled in a different manner.

Mr. Walton remarked that it was a good thing that there are a number of working without permit cases being brought to the Board, that it means Staff is doing their job.

X. Adjournment:

The meeting was adjourned without benefit of a motion.

TOWN OF PALM BEACH

POLICE DEPARTMENT

A NATIONAL AND STATE ACCREDITED LAW ENFORCEMENT AGENCY

CODE ENFORCEMENT BOARD MINUTES
2:00 P.M. THURSDAY, JULY 17, 2008
AT THE TOWN COUNCIL CHAMBERS, 360 S. COUNTY ROAD

I. **Call to Order**: The meeting was called to order at 2:00 p.m. by Chairman Timothy Hoffman.

II. **Roll Call:**

Present:
Timothy Hoffman, Chairman
Harris Fried, Vice Chairman
Larry Ochstein, Member
Catherine M. Duemler, Member
Madelyn Greenberg, Member
Cynthia Van Buren, Member
James M. Ballentine, Jr., First Alternate
William P. Vanneck, Second Alternate

Absent:
Joel P. Koeppel, Member

Staff:
John Randolph, Town Attorney
Captain Kirk Blouin, Support Services
Rob Walton, Lead Code Enforcement Officer
Nick Gerry, Code Enforcement Officer
Bryant Weymer, Code Enforcement Officer
Raychel Houston, Recording Secretary

III. **Approval of the Minutes of June 19, 2008:**

MOTION BY MS. DUEMLER FOR APPROVAL OF THE JUNE 19, 2008 MINUTES
MOTION SECONDED BY MS. GREENBERG
MOTION PASSED UNANIMOUSLY

IV. **Administration of the Oath to all persons who wish to testify:**

Let the record show that all persons wishing to testify were sworn in at this time by Recording Secretary Raychel Houston.

V. Public Hearings:

A. Case # 08-2431, 434 Seaspray Ave., Christopher Kaufman
Violation of Chapter 18, Section 18-242, Subsection 1 (104.1.1) of the Town of Palm Beach Code of Ordinances, building permits required to construct, install, repair or alter any building or building system.

Lead Code Enforcement Walton requested the case be postponed until a date certain of September 18, 2008 as Mr. Kaufman has a hearing before the Town Council.

MOTION BY MS GREENBERG TO POSTPONE THE CASE UNTIL STEPTEMBER 18, 2008
SECONDED BY MR. OCHSTEIN
MOTION PASSED UNANIMOUSLY

B. Case # 08-2511, 114 N. County Rd., Palm Beach Affair
Violation of Chapter 46, Section 46-68 of the Town of Palm Beach Code of Ordinances, annual fire and life safety inspection fees not paid

Code Enforcement Officer Gerry requested the case be dismissed as it had come into compliance and the fees had been paid.

MOTION BY MR. FRIED TO DISMISS THE CASE
SECONDED BY MS. GREENBERG
MOTION PASSED UNANIMOUSLY

C. Case # 08-2512, 235 Sunrise Ave., Suite C8, Palm Beach Resorts International
Violation of Chapter 46, Section 46-68 of the Town of Palm Beach Code of Ordinances, annual fire and life safety inspection fees not paid

Code Enforcement Officer Gerry presented the facts of the case and said the Town recommends a finding of non-compliance, administrative costs in the amount of $150.00 and payment of the fire inspection fee in addition to any late penalties and costs by July 21, 2008. Mr. Hoffman inquired about the late penalties and Mr. Gerry said they were based on a monthly penalty of 10% per month. In response to Mr. Ochstein's question, Mr. Gerry explained that both the business and the property owner were cited. Mr. Fried inquired about service and Mr. Gerry said it was sent by certified mail. Mr. Ballentine asked if any attempts, other than by mail, were made to get in touch with someone at the business. Mr. Gerry said he went to the business, was told the owner was difficult to reach and left his business card but had not received any response.

MOTION BY MR. FRIED TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND ORDER THEM TO PAY THE FIRE INSPECTION FEE IN ADDITION TO ANY LATE PENALTIES AND COSTS BY JULY 21, 2008.
SECONDED BY MS. GREENBERG
MOTION PASSED UNANIMOUSLY

D. Case # 08-2513, 329 Worth Ave., Dunville L'Antiquaire, LTD
Violation of Chapter 46, Section 46-68 of the Town of Palm Beach Code of Ordinances, annual fire and life safety inspection fees not paid

Code Enforcement Officer Gerry presented the facts of the case and said he followed up after the certified letters were sent but the business could not be contacted. The Town recommends a finding of non-compliance, administrative costs in the amount of $150.00 and payment of the fire inspection fee in addition to any late penalties and costs by July 21, 2008.

MOTION BY MS. GREENBERG TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND ORDER THEM TO PAY THE FIRE INSPECTION FEE IN ADDITION TO ANY LATE PENALTIES AND COSTS BY JULY 21, 2008.
SECONDED BY MS. VAN BUREN
MOTION PASSED UNANIMOUSLY

E. Case # 08-2514, 235 Sunrise Ave., C8, C.J.'s Simply Gourmet, Inc.
Violation of Chapter 46, Section 46-68 of the Town of Palm Beach Code of Ordinances, annual fire and life safety inspection fees not paid

Code Enforcement Officer Gerry presented the facts of the case and recommended a finding of non-compliance, administrative costs in the amount of $150.00 and payment of the fire inspection fee in addition to any late penalties and costs by July 21, 2008. Mr. Gerry said he also tried to make contact with the owner of this business as it is the same owner as the other case at this location but was unable to make contact. Mr. Ochstein remarked this was the same business that had been before the Board before and had even "bounced a check" to the Town and wanted to know if there was something more that could be done other than the standard $150.00 costs. Mr. Gerry said he could review the case further to see if it could be brought back for additional fines. Mr. Hoffman asked if these cases were brought to Code Enforcement by the Finance Department and Mr. Gerry said they came from the Fire Prevention Bureau who handles their own billing and explained the procedure for that. Mr. Hoffman said it seemed like a year was a long time for these cases to be in arrears. Mr. Gerry said the cases were coming over quicker now from Fire Prevention and he thought it would improve in the future.

MOTION BY MR. OCHSTEIN TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND ORDER THEM TO PAY THE FIRE INSPECTION FEE IN ADDITION TO ANY LATE PENALTIES AND COSTS BY JULY 21, 2008.
SECONDED BY MR. FRIED
MOTION PASSED UNANIMOUSLY

F. Case # 08-2515, 140 N. County Rd., Bank of America
Violation of Chapter 46, Section 46-68 of the Town of Palm Beach Code of Ordinances, annual fire and life safety inspection fees not paid

Code Enforcement Officer Gerry presented the facts of the case and said he had spoken with Robin Gert who advised him the bill had been mishandled and gotten lost in their system. He said he spoke to her yesterday and was told the payment was still in process. The Town recommends a finding of non-compliance, administrative costs in the amount of $150.00 and payment of the fine inspection fee in addition to all late penalties and costs by August 4, 2008.

MOTION MADE BY MS. GREENBERG TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND ORDER THEM TO PAY THE FIRE INSPECTION FEE IN ADDITION TO ANY LATE PENALTIES AND COSTS BY AUGUST 4, 2008.
SECONDED BY MS. DUEMLER
MOTION PASSED UNANIMOUSLY

G. Case # 08-2516, 313 ½ Worth Ave., # B2, David Clark
Violation of Chapter 114, Section 114-32 of the Town of Palm Beach Code of Ordinances, business tax receipt required

Code Enforcement Officer Gerry presented the facts of the case and said Mr. Clark had submitted his paperwork and paid the fee but there was a zoning issue still in question. The Zoning Administrator is out of the office this week on jury duty and based on the inability to get the issue resolved, the Town recommends the case be postponed until the August 21, 2008 hearing date.

Mr. Fried questioned what the zoning issue had to do with a business tax receipt and Mr. Gerry said the Town records do not show this particular suite existing at this address but Mr. Clark has documents showing it there.

Mr. Gerry said zoning is tied into business tax receipts because zoning requirements do not allow certain businesses in some districts. There is also the question of whether the space is legitimate because people will subdivide suites and make two spaces where there should only be one. Mr. Gerry said it looked like a legal space from the documentation Mr. Clark provided but the Zoning Administrator needed to approve it.

MOTION BY MR. FRIED TO POSTPONE THE CASE UNTIL THE AUGUST 21, 2008 HEARING DATE
SECONDED BY MS. VAN BUREN
MOTION PASSED UNANIMOUSLY

H. Case # 08-2517, 2270 E. Ibis Isle Road, Mark Remson Trust
REPEAT Violation of Chapter 42, Section 42-86 of the Town of Palm Beach Code of Ordinances, Environment, properties to be maintained in a good condition.

Code Enforcement Officer Weymer presented the facts of the case and said the violation was discovered from routine patrol in the area but shortly after the notice of repeat violation was sent out, a citizen complaint was received as well. Mr. Weymer said there had been at least seven previous letters to this property owner regarding lack of maintenance on the property. A repeat notice of code violation was mailed out on June 24, 2008 with a mandatory hearing date. The lot was cut on or around July 2, 2008. This particular violation is a Class II violation under the fine schedule which calls for a fine of $400.00, however, by law, the Board has the ability to impose a fine of up to $500.00 because it is a repeat violation. Mr. Weymer said he believes it is important to look at the track record of this property in considering the fine. The Town recommends a finding of non-compliance, administrative costs in the amount of $150.00 and a fine of $500.00, which is the maximum fine for a repeat violation.

Mr. Hoffman said it seemed that every time the property owner gets notified he comes into compliance but he has to be notified. Mr. Weymer says there are times when he comes into compliance but on at least two other occasions, he has been before the Board because he has not complied by the time set. Mr. Ochstein asked if he has been fined in the past and Mr. Weymer said there are two outstanding fines for which liens have been placed on the property.

MOTION BY MS. GREENBERG TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND A FINE OF $500.00
SECONDED BY MS. DUEMLER
MOTION PASSED UNANIMOUSLY

I. Case # 08-2518, 230 Esplanade Way, Kenneth J. Horton

Violation of Chapter 42, Section 42-86 (19) of the Town of Palm Beach Code of Ordinances, cleared land must be re-sodded or replanted to prevent the creation of windblown dust or dirt and Chapter 42, Section 42-86, unsightly, unsafe or unsanitary conditions not permitted and properties to be maintained in good condition.

Code Enforcement Officer Weymer presented the facts of the case and said the violation was discovered on routine patrol. Mr. Weymer has been in contact with a property representative, Louis Pascerelli who said Mr. Horton had not been in Town to receive his mail. Mr. Weymer said Mr. Pascerelli had proposals from Hansen Landscape for the clean up and re-sod of the lot and a weekly maintenance contract to assure this does not happen again. Tropical Irrigation has also been contacted to put in a new irrigation system. The Town recommends a finding of non-compliance, administrative costs in the amount of $150.00 and the property owner given until August 18, 2008 to come into compliance. Mr. Fried said he believed a fine of some sort should be imposed. Mr. Ballentine asked how long Mr. Horton had been out of compliance. Mr. Weymer said the original warning was sent out on June 5, 2008 and a notice of violation and hearing was sent out on June 20, 2008. Mr. Weymer said the first contact with him was July 7, 2008. Mr. Ballentine asked if the August compliance date was reasonable and Mr. Weymer said Jim Hansen of Hansen Landscape thought it would be done before that date but he wanted more time in case he ran into any problems.

MOTION BY MR. FRIED TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND GIVE HIM UNTIL AUGUST 18, 2008 TO COME INTO COMPLIANCE.
SECONDED BY MR. OCHSTEIN
MOTION PASSED UNANIMOUSLY

J. Case # 08-2519, 206 Dunbar Road, AMF Estate Management
Violation of Chapter 42, Section 42-230 of the Town of Palm Beach Code of Ordinances, leaf blower over 65dBA at 50 ft.

Code Enforcement Officer Weymer presented the facts of the case and said he witnessed the violation on June 26, 2008. AMF had previously been warned on February 19, 2008 for using a leaf blower over 65dBA. Mr. Weymer performed a decibel test for this violation and the reading was 79.6 dBA at 50 feet. This is a class II violation under the fine schedule which has a $125.00 fine for the first offense. The violation was issued on site to a superintendant for AMF and has not been paid. The Town recommends a finding of non-compliance, administrative costs in the amount of $150.00 and payment of the $125.00 fine.

Mr. Hoffman asked whether this company had participated in the leaf blower testing being offered by Code Enforcement. Mr. Weymer said AMF had participated in the testing program and had several leaf blowers certified. He said

the truck he was out with had 2 other leaf blowers on the truck that he could identify as being over 65dBA but he only tested the one they were using and wrote a violation for that one. Ms. Van Buren asked about the testing method and Mr. Weymer explained how it was done.

MOTION BY MR. OCHSTEIN TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND ORDER HIM TO PAY THE $125.00 FINE
SECONDED BY MS. VAN BUREN
MOTION PASSED UNANIMOUSLY

K. Case # 08-2520, 165 Brazilian Ave., Richard Lynn
Violation of Chapter 10, Section 10-45 (i) of the Town of Palm Beach Code of Ordinances, if any dog attacks and causes severe injury or death to any human or domestic animal more than once, the owner shall be required to have said dog removed from the Town or humanely euthanized at his/her sole expense and violation of Chapter 10, Section 10-6 of the Code which prohibits animals from creating nuisances which are detrimental to the public safety and welfare.

(Mr. Ochstein recused himself, stating that he has a relative who has a business relationship with Dr. Lynn and Mr. Hoffman advised Mr. Vanneck would be a voting member in this case)

Sgt. Curtis Krauel said this case was brought to Code Enforcement through a culmination of events spanning back over a period of 4 years. Sgt. Krauel explained Section 10-6 of the Code and said he was going to be showing some graphic photographs. Sgt. Krauel presented the facts of each of the documented cases involving attacks by Duke from March 17, 2004 until May 11, 2008.

Mr. Hoffman questioned how the Code Enforcement Board came into this procedure since the Town Council had already said Duke is a dangerous dog. Mr. Randolph explained that Town Council does not have the authority to fine. Originally, the police department did not issue a code enforcement board citation but ordered the dog be removed from the Town or humanely euthanized which was appealed to Town Council. Town Council denied the appeal. Since that time, Dr. Lynn has refused to comply with the order of the Town Council so a citation was issued by Code Enforcement to bring the matter before the Board to determine whether there should be a finding of violation and at a later time, whether a fine should be imposed. Mr. Randolph said it was now the jurisdiction of the Code Enforcement Board and not the Town Council. Mr. Hoffman questioned whether or not the Board had to determine if the dog was going to be euthanized or removed from the Town and Mr. Randolph explained that this was not the Board's determination. The Board was only to determine whether or not there had been a violation of the Town Code.

Sgt. Krauel continued his presentations remarking that once Duke had been found "potentially dangerous" by Animal Care and Control, there had been another attack but due to an administrative error by Animal Care and Control by failing to document their records appropriately, Duke was classified as "potentially dangerous" again. This is an error that Animal Care and Control completely acknowledges.

After the last attack on May 11, 2008, Duke was taken into custody by Animal Care and Control and after a hearing, was classified as "dangerous". Sgt. Krauel noted that the hearing before Special Magistrate Earl Mallory did not classify Duke as vicious because Duke had no documented cases of attacks on humans. After this last case was reviewed by Code Enforcement, sufficient evidence was also found to classify Duke as dangerous and Dr. Lynn was notified by registered mail. Dr. Lynn appealed to Town Council and that appeal was denied by Town Council by a 5-0 vote. The Town recommends a finding of non-compliance with Chapter 10, Section 10-6 as the Town has the two required affidavits of residents of the Town occupying separate households. The Board had been provided with copies of four (4) affidavits.

Sgt. Krauel then proceeded with an explanation of Chapter 10, Section 10-45 and said the Town was requesting a separate motion for a finding of non-compliance of Chapter 10, Section 10-45 (i) and that he be given until July 18, 2008 to come into compliance by either removing the dog from the Town or having it humanely euthanized. If compliance is not achieved, the Town recommends a daily fine of $250.00 a day commence on July 19, 2008 and continue until compliance is achieved.

Mr. Randolph requested that the Board treat these two sections of the Code separate and apart. He said the first evidence heard related to Section 10-6 (3) and involved the affidavits from the residents of the Town. Because of the dispute Dr. Lynn's attorney has with regard to the manner that Section 10-45 was applied, he recommended that the two Code sections not be mixed up. Mr. Randolph said he would like for the Board to first consider whether there had been a violation of 10-6 and to make a motion one way or the other with regard to the Staff's recommendation. He then requested that Section 10-45 be entertained separately after Dr. Lynn's attorney and anyone else who wanted to speak had an opportunity to do so.

Vivian Dorris, 155 Brazilian Ave. said her beagle/bassett, Charlie, was viciously attacked by Dr. Lynn's dog, Duke and she has sustained approximately $8500 in vet's bills. She said her dog will never walk properly again because of severe nerve damage. She does not feel there are enough precautions being taken for the safety of residents on Brazilian Ave. She asked that the Board take this into consideration and thanked them for their service.

Wayne Gerl, 149 Brazilian Ave. said he has two dogs and every time he exits his driveway or front yard, he has to stop and peek around and make sure the other dogs are not in the area. He said he was bitten by Duke a couple of years ago. He was talking with Dr. Lynn and the dog just reached out and bit him, tore his pants and broke the skin. He said he had been friends with Dr. Lynn and Margrit for many years but it was just unsafe for anybody and any animals in the area.

Bobby Goodnough said he was jogging in the area and the dog lunged at him causing him to have to dive through a twelve (12) foot hedge to get away from it. He said he just thought it was a matter of time before the dog got a person or a child. Sgt. Krauel asked if Mr. Goodnough had reported the incident to the police department or had a time frame for when it occurred. Mr. Goodnough said he had not made a police report but it occurred about two (2) years ago.

Laura Klein, 130 Seaspray Ave., said she had lived here for 12 years, having moved here from Washington, D.C. for a sense of security. She said she was now in the process of installing surveillance cameras. She said she could no longer walk her dog without constantly looking around, worrying if Duke had once again escaped from the open gates. She said it is a privilege to own a dog and dog ownership and responsibility should go hand in hand. She said Dr. Lynn was issued a citation in August of 2002 for locking his dog in a car with the windows rolled up. She said she mentioned this to prove his irresponsibility. She said his voluminous file from Animal Care and Control would attest to this. She said no one was safe while Duke is in Palm Beach.

James Merola was present on behalf of Dr. Lynn and said he was present on a revised Notice of Code Violation and Hearing dated July 15, 2008. He said he was not denying there were incidents with Duke. Palm Beach County had the dog taken into custody and the hearing was held June 5, 2008. At that hearing, it was agreed upon by the County and Dr. Lynn that the dog would be classified as dangerous. The dog was classified as dangerous which required certain restrictions on the dog which Dr. Lynn complied with and the dog was returned to him. In the event Duke has another incident, pursuant to state and county law, but some reason not Town law, the dog would be taken into custody and euthanized. Mr. Merola said Dr. Lynn feels very badly about the situation and agreed with the County to do what they required. Mr. Merola said Dr. Lynn then received a letter, dated June 16, 2008 from the police department, mentioning the order of the County and stating for the first time, the Town was declaring the dog dangerous and giving him ten (10) days to appeal, which he did not. On June 20, 2008, four (4) days after the dog was declared dangerous by the Town, the police department sent a second letter, citing 10-45 (i), advising that since the dog already had two incidents, they wanted it removed or euthanized. The dog had not done anything since being declared dangerous. This letter did not mention an appeal, but he sent a letter anyway, stating that they did not agree with that. He said the dog was declared dangerous on the 16th, requirements were imposed and they complied with those, including the filing of a $1000 bond and they did not agree the dog should now be removed. There was a Town Council hearing on August 8th and the Council said they needed to have the dog removed or euthanized. Mr. Merola went into detail about the requirements of 10-45 and said

Dr. Lynn had complied with all of those. Then the letter of June 20th came, requiring Dr. Lynn to remove the dog or euthanize it. Mr. Merola read subsection (h) into the record and said the Code Enforcement Board did not have any jurisdiction over subsection (i) as subsection (h) just mentioned (d) through (g). The Town has filed a lawsuit and he and Mr. Randolph were before Judge Hoy this morning. The Town is asking to have the dog removed or euthanized and asking for a permanent injunction, stating an emergency situation. Judge Hoy gave them a hearing at 1:30 p.m. on Tuesday where it will be determined whether the dog is a nuisance, whether 10-45 (i) even applies to the situation and if the Board have authority over 10-45 (i). If the Judge says the dog has to go, they are not going to argue with the Court but he believes they have a right to present their case. He does not believe that the Town's position that the fine should start tomorrow is correct. He believes the Board can only find violations of subsections (d) through (g) of 10-45. There have been no allegations that Dr. Lynn has violated subsections (d) through (g). Mr. Merola believes it is clear that the Code Enforcement Board has no authority under (i). Mr. Merola then addressed 10-6 and said he believed that since all precautions have been taken under 10-45, the dog does not constitute a nuisance. Mr. Merola said that he has an injunction relief request before the Judge to stop the Board from making this decision. Mr. Merola said Mr. Randolph has asked them to determine these two (2) ordinances separately and he does not believe 10-45 (i) is in the Board's purview, and as to the nuisance, the dog has to be a nuisance now and it is not. This is all going to be determined Tuesday and he is asking the Board to either deny the Town's recommendation because the Town cannot prove the dog is a nuisance now or reset this case until next month's hearing.

Sgt. Krauel advised he wanted to make a rebuttal to some of Mr. Merola's comments. The service of notice Mr. Merola referred to in declaring the dog dangerous was when the police department spoke with Dr. Lynn on June 12, 2008 and had been told Duke was being housed at a kennel in Palm Beach County. A notice could not be served to Dr. Lynn to have him come into compliance with something he was already in compliance with. The dog was not in the Town. The police department did not find out the dog was in Town until June 20th when Laura Klein reported the dog attempted to break free of Dr. Lynn to attack her and this is when the letter was sent out requesting compliance with Section 10-45. Dr. Lynn was given the entire ordinance on June 10th, not just sections or specific acts that he needed to comply with. Duke was not on the property at that time and no notification to remove the dog from the property could be served at that time because the dog was not there. As far as the police department was concerned, Dr. Lynn was in compliance with the ordinance. Sgt. Krauel pointed out that the Town does not abide by the state and the county ordinances, that the Town has the ability to enforce more stringent and strict ordinances and that is what we have done here.

Sgt. Krauel said he was prepared, based on Counsel's recommendation, to recommend a motion to find Dr. Lynn in non-compliance with Section 10-6 and move to postpone 10-45 (i) until after further consideration by the Circuit Court on Tuesday. The Town recommends administrative costs in the amount of $150.00 and a fine of $250.00 a day to start on June 19, 2008 if compliance is not achieved by tomorrow.

Mr. Ballentine asked for clarification on the motion and was advised by Mr. Randolph that it would be a finding of non-compliance of Chapter 10, Section 10-6, administrative costs of $150.00 and a compliance date of July 18, 2008 with a fine to be considered at the next meeting if compliance was not achieved.

Ms. Duemler said she believed that the dog, besides being a nuisance, is a threat to society and she hoped that by Tuesday the dog did not break loose from Dr. Lynn and maul some child, that she believed it is a disgrace and she supports the Town.

(*applause from the audience*)

MOTION BY MR. FRIED TO FIND DR. LYNN IN VIOLATION OF CHAPTER 10, SECTION 10-6, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND REQUIRE HIM TO COME INTO COMPLIANCE BY JULY 18, 2008
MOTION SECONDED BY MR. BALLENTINE
MOTION PASSED UNANIMOUSLY

Mr. Randolph asked if a motion could be made to defer the consideration of violation of Chapter 10, Section 10-45 (i) until the August 21, 2008 meeting and Ms. Greenberg advised she would make that motion. Mr. Fried asked Mr. Randolph if he would explain the reason for this. Mr. Randolph said the argument had been made that 10-45 should not apply because the dog has already been deemed dangerous by the County and pursuant to the Town's Code. Mr. Randolph said he believed the argument was going to be made in court on Tuesday that it is not appropriate for the Town to move forward with regard to 10-45 (i) because that only applies to any incident that occurs after the dog has been declared dangerous. The argument has been made that Dr. Lynn has done everything he is required to do. Mr. Randolph said he hesitated to explain further if the matter was going to be deferred. Mr. Randolph said the position of Staff is that item (i) stands on its own merits, that it is not connected to 10-45 (a) through (h). It is also the position of Staff that it is appropriate to bring a violation of (i) to the Code Enforcement Board even though it does not specifically state that in 10-45 because Section 2-439, which is the citation fine schedule, sets forth all of the sections of the Code of Ordinances which can be brought before the Code Enforcement Board and 10-45 is listed. Code Enforcement has the right to bring a violation directly to the Code Enforcement Board instead of issuing the fine set forth in the fine schedule. Mr. Randolph said the Board could move forward in considering 10-45 instead of deferring it to the next meeting.

Mr. Fried commented that based on the egregious nature of what they had been presented with, he believed the Board should do everything they could to put pressure on Dr. Lynn to comply. Mr. Randolph questioned whether the Town would be requesting a separate fine of $250.00 a day for non-compliance and Sgt. Krauel said that was his recommendation, that there would be two concurrent fines running. Mr. Hoffman asked about the administrative costs and Sgt. Krauel said the Town was only asking for one.

MOTION BY MR. FRIED TO FIND DR. LYNN IN VIOLATION OF CHAPTER 10, SECTION 10-45 (i) AND REQUIRE HIM TO COME INTO COMPLIANCE BY JULY 18, 2008
SECONDED BY MS. GREENBERG
MOTION PASSED UNANIMOUSLY

Mr. Merola questioned what the order was with regard to 10-6, if it was to have the dog removed or euthanized by Friday or just to abate the nuisance. He said he needed to know what to tell Dr. Lynn what had to be done by Friday to avoid the potential fine. Mr. Hoffman said Dr. Lynn needed to either remove the dog or have it euthanized and Mr. Fried said that was his intention in making the motion.

VI. Old Business:

A. Case # 08-2484, 515 N. County Road, Trump Properties, LLC
Violation of Chapter 18, Section 18-205 of the Town of Palm Beach Code of Ordinances, the Architectural Commission may attach conditions to any approval it grants.

Lead Code Enforcement Officer Walton advised this case would be heard at Town Council on August 11, 2008 and requested this case be postponed until the August 21, 2008 hearing date. Mr. Trump's attorney and the attorney for the new purchaser were both present.

Robert Brody said he was the attorney for County Road Property LLC, who had just purchased the property two days ago. He said it was the intent of his client to comply with the Town and also to work with the Town. There is an appeal pending and Mr. Brody said it was his client's intent to work everything out with ARCOM prior to that appeal. He said he had recommended to his client that he withdraw the appeal. Mr. Brody said his client had hired the Lawrence Group and Gene Lawrence planned to work with ARCOM.

MOTION BY MS. DUEMLER TO POSTPONE THE CASE UNTIL THE AUGUST 21, 2008 MEETING
SECONDED BY MS. VAN BUREN

MOTION PASSED UNANIMOUSLY

VII. Fine Consideration:

A. Case # 08-2432, Beachfront Vista Property, Nightingale Beach Club Association
Violation of Chapter 134, Section 134-1472 (3) of the Town of Palm Beach Code of Ordinances, no additional walls, fences, hedges or other structures or growth shall be erected or be grown eastwardly of Ocean Boulevard to a height greater than four (4) feet above the surface of the Ocean Boulevard.

(Ms. Duemler recused herself as part of a previously declared conflict and Mr. Hoffman advised Mr. Vanneck would be a voting member in this case)

Lead Code Enforcement Officer Walton said Nightingale Beach Club had previously been found in violation and were given time to obtain a permit. A permit had been obtained but there were some conditions attached to it. There have been two (2) inspections with the Florida Wildlife Commission and an agreement was reached to not require the vegetation to be trimmed until after turtle season. Since they have already been found in non-compliance, the Town recommends the time fro compliance be extended to November 7, 2008 and if compliance is not achieved by that date, a fine of $250.00 a day be imposed.

Jack Maxey, 244 Nightingale Trail, presented some documents to the Board and advised he was president of the Nightingale Trail Beach Club Association. He said one of the documents was his application under duress for the permit. Mr. Maxey advised he had not been sworn in and was administered the oath of office by Recording Secretary Houston.

Mr. Maxey said he has had a long correspondence with the legal department of the Department of Environmental Protection and he believes on an emotional level, they do not believe the trees should come down but they told him they could not find any statutory way to force the Town not to enforce the permit. They told him it should be the jurisdiction of a court, not the DEP. Mr. Maxey said the Town was cutting down its own sea grapes in violation of the permitting process. Mr. Maxey said he had all kinds of burdens in this permit that he needed to comply with, one of which was replacement of the whole plant if anything over 6 feet which was larger than 3 inches in diameter was cut down. He said he was supposed to provide a signature on the document putting himself at risk of a $10,000 a day fine if he did not comply with the requirements of the permit. Mr. Maxey said Jean Higgins, a biologist for the State Fish & Wildlife, recommended sea grapes should not be trimmed because they are the best source of protection against the lighting. Ms. Higgins made some suggestions such as changing light fixtures and extinguishing lights during turtle season and maintaining a substantial healthy vegetation light blocking buffer.

Mr. Maxey said an approximate 24 inch piece of aluminum is hanging from the light on Nightingale Trail and it seemed highly unusual that a shield of that nature would only be necessary on that light when the recommendations given by Fish & Wildlife are recommendations with broad reaching impact for the entire island. He noted that the street lights in Palm Beach do not go off during turtle nesting season. He said a field permit for trimming of the sea grapes at the Nightingale Beach Club Association was not recommended during the nesting season. He said the indifference to materials he had brought forth more than a year ago that had now been brought forth officially by the DEP were offensive to him and that is one of the reasons he had continued to "hammer" this. He said he believed the Board should recommend to the Town Council that they remove that section of the Code, given the current environmental regime, especially when one considers the public relations downside of fighting him on this issue and spending $2,000,000 to fight Lake Worth on the other side. Mr. Maxey said this was probably not a win-win situation and that NOAA had not even been brought into the fold yet.

Mr. Ochstein wanted to know if the Board was precluded from enforcing the ordinance now. Mr. Walton said it should not be enforced now, that in speaking with Mr. Wettstein from DEP and Ms. Higgins from FWC, an agreement had been reached to wait until the end of turtle season to require the trimming. The Town recommends granting the Nightingale Beach Club until November 7, 2008 to come into compliance. The permit is good until that date. In response to Mr. Hoffman's question, Mr. Walton said the permit was issued on June 16, 2008. Mr. Maxey said he applied on March 19, 2008. Mr. Balletine inquired as to whether seven (7) days was sufficient for compliance after the end of turtle season and Mr. Walton said it was not a large area and he believed it was. Mr. Maxey said he did not believe it was sufficient, that it would be an economic hardship if he had to replace every tree that is over 3 inches in diameter in order to get it below 6 feet and he brought up other issues involved with the trimming. Mr. Balletine told Mr. Maxey he just wanted to know whether he could comply in a 7 day period without going into a lot of detail. Mr. Maxey said that before he could remove any native plant, he had to first remove every single non-native one from the property and he had some questions whether or not he could comply within the time period. He also said he had some real questions about whether the law, both at the State and the local level had been equally applied within the Town. Mr. Maxey said he is in consultation with an attorney to find out what measures he can take. The Town did not apply for a permit to cut its own sea grapes and judging from the guidelines he has in his permit, the Town would be in violation of almost everyone of those guidelines. The DEP counsel's office asked him to provide photographs of the Town's illegal cutting back in February.

Mr. Vanneck said there should be more research as to what should and should not be cut. He believes the Town code may have gone too far.

Mr. Hoffman said the Board did not have the authority to modify the Code and could only enforce the Codes as they had been written.

MOTION BY MR. OCHSTEIN TO GRANT THE VIOLATOR UNTIL NOVEMBER 7, 2008 TO COME INTO COMPLIANCE AND IF COMPLIANCE IS NOT ACHIEVED BY THAT DATE, TO ASSESS A FINE IN THE AMOUNT OF $250.00 A DAY UNTIL COMPLIANCE IS ACHIEVED
SECONDED BY MR. BALLENTINE

Mr. Vanneck asked for clarification on what the motion was and Mr. Walton advised the motion was that the sea grapes must be cut after turtle season by November 7, 2008 and if they were not cut by that date, a $250.00 a day fine would commence on November 8, 2008 and continue until compliance is achieved.

Mr. Fried asked who the fine would apply to and Mr. Walton said it would be to the Nightingale Trail Beach Club Association. Mr. Fried asked if it was a legally constituted body and Mr. Maxey said it was an informal body, that on the deeds, everyone owns this piece of property in common. There was some additional discussion on the ordinance. Ms. Van Buren asked if every single property owner on the street was a member of the association and Mr. Maxey said every property owner on Nightingale was and there were one or two houses on North Ocean and North Lake as well. Mr. Maxey said there were 23 separate memberships. Ms. Van Buren asked about the finances and Mr. Maxey said there were annual dues of $75.00 a year and a common bank account of $3500 or $3600. Mr. Maxey said that if a fine was incurred, that is probably where it would come from but he did not believe, because of his fiduciary responsibility to the group, he could fight the decision with any of those monies. Mr. Ochstein asked if he was an elected officer and Mr. Maxey said he was president and that he keeps the books and makes sure the place is in good condition.

MOTION BY MR. OCHSTEIN TO GRANT THE VIOLATOR UNTIL NOVEMBER 7, 2008 TO COME INTO COMPLIANCE AND IF COMPLIANCE IS NOT ACHIEVED BY THAT DATE, TO ASSESS A FINE IN THE AMOUNT OF $250.00 A DAY UNTIL COMPLIANCE IS ACHIEVED
SECONDED BY MR. BALLENTINE
MOTION OPPOSED

ROLL CALL VOTE:

MR. OCHSTEIN	**YES**
MR. BALLENTINE	**YES**
MR. FRIED	**YES**
MS. GREENBERG	**YES**
MS. VAN BUREN	**YES**
MR. VANNECK	**NO**
MR. HOFFMAN	**YES**

MOTION PASSES 6-1

Mr. Fried advised Mr. Maxey that the Code Enforcement Board's position was to enforce the Code and said that he had always found the Town Council members to be very receptive, individually and as a group. Mr. Fried said it was not beyond the Town Council's power and authority, if persuaded, to look into an ordinance and suggested Mr. Maxey address it with them.

B. Case # 08-2508, 227 Brazilian Ave., 2F, Hillen J. Smith

Violation of Chapter 18, Section 18-241 of the Town of Palm Beach Code of Ordinances, building permits required to construct, install, repair or alter any building or building system

Lead Code Enforcement Officer said Mr. Smith was found in violation, assessed $150.00 in administrative costs and given until July 16, 2008 to come into compliance. Compliance has not been achieved so this is the time a fine would be assessed. Mr. Walton said the contractor was present to speak.

Steve Pappanelli said he was hired by Mr. Smith after Mr. Smith had been cited and he was 90% complete with the job. He was just waiting on his final inspections and he should have it by next week but the building is closed to all construction inspections for two (2) weeks. Mr. Pappanelli said he was present on Mr. Smith's behalf to request a three (3) week extension. Mr. Walton said the Town did not oppose the extension of time. Mr. Walton said the three weeks was necessary because the building would not let inspections be done while their maintenance man was on vacation. Mr. Walton said if compliance was not achieved by August 7, 2008 then he would ask for a $250.00 a day fine to commence on August 8, 2008.

Ms. Greenberg asked some questions about the type of permits and remarked that it is unfortunate in multi-family dwellings that this type of situation would exist to begin with because electrical and plumbing can have catastrophic effects on other owners. She said it is unfortunate the people do not do the right thing until they get caught. Mr. Pappanelli said he was not the contractor working without permits.

MOTION BY MR. OCHSTEIN TO GRANT AN EXTENSION OF TIME UNTIL AUGUST 8, 2008 TO COME INTO COMPLIANCE AND TO ASSESS A FINE OF $250.00, RETROACTIVE TO JULY 17, 2008 IF COMPLIANCE WAS NOT ACHIEVED
SECONDED BY MS. GREENBERG

During discussion on the motion, Ms. Duemler stated she believed the retroactive fine was a little harsh. Mr. Ballentine said he agreed and asked what the reason for the retroactive fine was. Mr. Ochstein said there are so many people who do work without a permit and they know they need a permit. That is a very dangerous thing in a multi-family dwelling and it should be egregious.

MOTION BY MR. OCHSTEIN TO GRANT AN EXTENSION OF TIME UNTIL AUGUST 8, 2008 TO COME INTO COMPLIANCE AND TO ASSESS A FINE OF $250.00, RETROACTIVE TO JULY 17, 2008 IF COMPLIANCE WAS NOT ACHIEVED
SECONDED BY MS. GREENBERG

MOTION PASSED UNANIMOUSLY

VIII. Fine Reduction:

A. Case # 08-2301, 167 E. Inlet Drive, The Landfall Group,
Violation of Chapter 18, Section 18-242, Subsection 104.5.1.6, medium projects, all new or remodel construction projects 4000 sq. ft, to 8,999 sq. ft. under roof be allowed 22 months

Lead Code Enforcement Officer Walton said in October, 2007, Ajax Equity LLC was found in violation of going over the construction time limits. On November 15, 2008 they still were not in compliance and a daily fine of $250.00 started running. The final inspection was obtained in March, 2008. The fine ran for 137 days prior to compliance being achieved and the accumulated fine due is $34, 250.00 and the have $150.00 hearing costs have not been paid.

Frank Lynch advised he was the attorney for both The Landfall Group and Ajax. He said when they appeared before the Board in October, Lazslo Wagner, the principal of The Landfall Group, who has built homes throughout the Town of Palm Beach for 26 years acknowledged that he was unaware of this particular Code provision. Had he been, they would have applied for an extension of time to complete the construction. At the hearing, Mr. Koeppel made a motion to allow them an additional sixty (60) days to complete the construction, find them in non-compliance and assess the $150 fee. After a significant amount of discussion, that motion went to a vote and failed 4-3. A second motion was made and Ms. Duemler thought the $250.00 fee was significant and she believed the fine should be $125.00 a day. Mr. Lynch gave Mr. Walton a copy of that transcript to put in the record. As part of their request, they are asking the Board to consider what Ms. Duemler suggested at the meeting. At the same time, Mr. Lynch said he would like them to consider that The Landfall Group is a good corporate citizen and made a legitimate mistake. As a result, a fine was incurred and they are willing to accept some level of fine, some level of responsibility for what they did. The construction was continually on going, there were no delays other than the construction process itself. This was not someone's house, it was a speculative venture. There had been some concerns with the shell contractor and the finish items themselves were significant enough that there were substantial delays. At that same hearing, Code Enforcement Officer Gerry said it was the position of Code Enforcement to get more assertive at the suggestion of Town Council and that these projects were to be more aggressively pursued. Under the new ordinance, for a house of approximately 5,000 sq. feet, they would be entitled to 24 months. This would have brought them to November 2007 and they would have gotten additional time for Hurricane Wilma which would have brought them to December. If they were under the new Code, they would not be before the Board today and may not have a fine at all. He realizes a mistake was made, he realizes something has to be paid but he thinks $35,000 is a significant fine. The Board has gotten their attention and they would ask for a significant reduction in the fine.

Mr. Fried asked how long it took to get the final inspection after the 22 months had run. Mr. Walton said they had been given 23 months due to the hurricanes and they were 5 months and 9 days beyond that. Mr. Ballentine asked how far out they would be under the new rules. Mr. Walton said they would be given 24 months which with the hurricane would be 25 months. Mr. Lynch said that at the end of that 24 month period, if they had not sought an extension of time prior to that within the required time period, no earlier than 6 months and no later than 45 days, before the expiration of that 24 months, their project would have been shut down. Mr. Wagner's lack of knowledge of this particular situation would have become irrelevant because they would have been red tagged on that next day after the 24 month period. Mr. Lynch said Mr. Wagner did not know because he has been a good corporate citizen, he had never been before the Board except on one occasion and that was beyond his control, it was a maintenance item on the Glazer house. Mr. Walton said that situation was not due to Mr. Wagner's fault, that he was just representing the owner.

Mr. Ballentine asked how Mr. Wagner did not know the Code requirement if he had built so many homes in the area and he said he had difficulty with the ignorance of that.

Mr. Fried said he agreed with Mr. Ballentine and he found it hard to believe that Mr. Wagner did not know the time limits. He said some reduction should be considered but he was not sure on what basis.

Mr. Ochstein remarked that the fine was around $35,000 and the house was on the market for $10.6 million dollars so he did not see the hardship. Mr. Lynch said he did not know the price but he would accept Mr. Ochstein's statement on that. Mr. Lynch said the hardship was in the imposition of the fine itself, there were mistakes made and he believed that Council would have given them a significant extension of time if Mr. Wagner had been aware of the situation and filed the proper notice with Town Council.

Mr. Lynch said if some sort of arrangement could be reached today, his client would be in a position to pay within the next two weeks. Mr. Hoffman said he was concerned because he believed that when the case was originally heard, they had the option of fining $250.00 a day and they gave them a fine reduction at the time they initiated the fine of $125.00 a day. Mr. Walton corrected Mr. Hoffman, advising that there was a motion for a fine of $125.00 a day which failed and the fine that is in effect is $250.00 a day. Mr. Lynch said he believed the record reflects something different than that. Mr. Walton said his records reflect $250.00 a day but he would review it. Mr. Walton reviewed the transcript and noted that it showed $125.00 a day but the Board order specified $250.00 a day and he would have to do further research.
Mr. Fried advised he could make a motion to postpone the matter to the next meeting and have Mr. Walton bring back the correct information. There was additional discussion about the amount of the fine and Mr. Lynch said he was seeking a reduction of the $17,125.00 which would be the amount of the fine if it was $125.00 a day. Mr. Hoffman said he would find that hard to accept. Mr. Hoffman read from the minutes that a motion was made by Mr. Fried that the defendant was found in non-compliance, ordered to pay an administrative fee in the amount of $150.00, obtain a final building inspection by October 25, 2008 and a fine of $125.00 to commence on October 26, 2007. He said that motion passed 4-3. Mr. Walton said he could not dispute that but he would have to do some research. Mr. Hoffman said he would not be in favor of reducing the $17, 125.00 any further.

Mr. Ochstein said he was hesitant to do anything until they know what the number is. Mr. Walton suggesting postponing the case until the next month.

MOTION BY MR. OCHSTEIN TO POSTPONE THE FINE REDUCTION HEARING UNTIL AUGUST 21, 2008
SECONDED BY MR. FRIED
MOTION OPPOSED

ROLL CALL VOTE:

MR. OCHSTEIN	**YES**
MR. FRIED	**YES**
MS. DUEMLER	**YES**
MS. GREENBERG	**NO**
MS. VAN BUREN	**NO**
MR. BALLENTINE	**YES**
MR. HOFFMAN	**NO**

MOTION PASSES 4-3

B. Case # 08-2302, 9 Via Vizcaya, Macari Building & Design, Casa Picchio, LLC
Violation of Chapter 18, Section 18-242, Subsection 104.5.1.6, medium projects, all new or remodel construction projects 4000 sq. ft, to 8,999 sq. ft. under roof be allowed 22 months

Lead Code Enforcement said the property was found in non-compliance and they requested a fine reduction hearing. The owner of the property was called out of town and they requested a postponement until the August hearing.

MOTION BY MS. GREENBERG TO POSTPONE THE FINE REDUCTION HEARING UNTIL AUGUST 21, 2008
SECONDED BY MS. VAN BUREN
MOTION PASSED UNANIMOUSLY

IX. Comments:

Ms. Greenberg said that the presentation using the "slides" made it too dark in the room. She wanted to know if there was anything they could do as a Board in making a suggestion to the Council about an ordinance that could address people not pulling permits because of the safety issues in terms of multi-family dwellings. Capt. Blouin said there was a provision in place. If work is done without a permit, there is a penalty involved. There was an ordinance drafted last year that requires them to pay four times the permit fee.

Mr. Fried asked Mr. Randolph if he had spoken to Mr. Elwell about the foreclosure action being brought to the Board's area of responsibility as opposed to the Town Council. Mr. Randolph said he had but did not have an answer yet and would try to get one. Mr. Fried asked Ms. Houston about progress on the fines and she said the Town was now inputting fines into the computer system and if someone had outstanding fines they could not get any permits. People are contacting Code Enforcement because they cannot get permits and are either paying or asking to come back to the Board for a fine reduction.

Capt. Blouin advised that with regard to any foreclosure action, the police department is scrutinizing each and every one of them as some of these cases we have liens on were pre-existing prior to coming to the police department. We do not want to bring a case to the board that can be handled in a different manner.

Mr. Walton remarked that it was a good thing that there are a number of working without permit cases being brought to the Board, that it means Staff is doing their job.

X. Adjournment:

The meeting was adjourned without benefit of a motion.

From: Kirk Blouin
To: John Page
Cc: Police Code Enforcement
Subject: Re: ARCOM
Date: Thursday, June 26, 2008 2:09:06 PM

JP,

Here is a copy of the minutes from the April CEB hearing. Each month thereafter the case was postponed because we were aware that it was being brought to ARCOM. Now that this matter has been resolved with ARCOM we will proceed with a code enforcement case until the property is in compliance (meaning they plant the shrubbery and hedges approved by the Town).

Sgt. Krauel or Rob Walton will be available on July 23rd as I will be attending a conference.

H. Case # 08-2484, 515 N. County Road, Trump Properties, LLC

Violation of Chapter 18, Section 18-205 of the Town of Palm Beach Code of Ordinances, the Architectural Commission may attach conditions to any approval it grants (Declaration of Use Agreement).

Lead Code Enforcement Walton presented the facts of the case and said the previous owner of the property, Abe Gosman, had been granted approval by the Architectural Commission to do some remodeling. One of the conditions of this approval was that the hedge along the front of the property be maintained in the condition it was in at the time the approval was granted. This agreement was a binding agreement, which passes on to any subsequent property owner. The agreement was made January 31, 1990. The subsequent buyer of this property was Mr. Trump, Trump Properties, LLC and some remodeling work was done, removing the previous hedge. A new hedge was planted to replace the original hedge and that one has now been removed. This is a violation of the agreement. A letter was received from Mr. Royce, representing Mr. Trump, asking for a postponement of today's hearing. The Town does not feel this matter should be postponed.

Mr. Randolph summarized the letter from Mr. Royce which indicated the ficus hedge keeps dying and they want to replace it with something different. They plan on hiring a landscape architect to go before the next Architectural Commission meeting to get approval to install a hedge in an attempt to meet the conditions of the declaration of use agreement. Mr. Randolph said he had discussions with Mr. Royce and Mr. Walton and Mr. Royce was told the Town could not recommend a postponement and the recommendation would be that they are found in violation, assessed the $150.00 in administrative costs and be given until June 18th, which is the day before the June Code Enforcement Board meeting, to comply. This would give them the opportunity to appear before the Architectural Commission to see if they can get approval to re-plant a hedge. The hedge has to be installed to the height which existed at the time of the agreement which Mr. Randolph said he believed was twenty-two (22) feet. Mr. Randolph said Mr. Royce was not present today because he had a planned vacation.

MOTION BY MR. FRIED TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS OF $150.00 AND GIVE THEM UNTIL JUNE 18, 2008 TO COMPLY.

SECONDED BY MS. VAN BUREN

MOTION PASSED UNANIMOUSLY

From: John Page/PalmBeach
To: Kirk Blouin/PalmBeach@PalmBeach
Cc: Tim Frank/PalmBeach@PalmBeach
Date: 06/26/2008 09:00 AM
Subject: ARCOM

Kirk: We had our June monthly ARCOM meeting yesterday. You likely know that ARCOM is working with Mr. Trump to re-install a hedge on his North County Road property. I believe this case is now pending in front of Code Enforcement. In May, ARCOM approved a plan to replace the former hedge with silver buttonwood shrubbery, which would additionally be back-planted with silver buttonwood trees....the overall effect would be an eventual 20' high screen. The shrubs have been planted, but yesterday attorney Ray Royce asked for postponing the trees until the end of the Hurricane season. ARCOM said NO and directed the attorney and landscaper to get the trees in ASAP. Also, more shrubbery was required at the main entry (north side) to match the newly installed hedge on the south side.

As the meeting was ending, the Commissioners asked for one of two things. They asked that either 1) a quick written report from Code Enforcement be made available to them at their next meeting on July 23 (9:00 a.m.) about the enforcement status of the case, or 2) that someone from Code Enforcement attend their meeting to provide a verbal status report. Their patience is wearing thin with the whole hedge issue, and it has them naturally curious about what is happening with their counterparts on Code Enforcement.

Would you or the appropriate representative from Code Enforcement be available on July 23? That would be my preference because follow-up questions almost always pop up. If not, can you provide me with a brief summary of your enforcement history and pending status? Thanks, JP

UC - PZ&B
PC - PZ&B
Dayton - ARCOM
Kramel - C.F.
Frank - ARCOM

RECEIVED
JUL 7 2008
TOWN CLERK

TRUMP PROPERTIES LLC
c/o The Mar-a-Lago Club
1100 South Ocean Boulevard
Palm Beach, Florida 33480

July 3, 2008

Ms. Susan Eichhorn, Town Clerk
Town of Palm Beach
360 South County Road
Palm Beach, FL 33480

Re: Trump Properties LLC
515 North County Road, Palm Beach, Florida

Dear Ms. Eichhorn:

Pursuant to Section 18-177 of the Town of Palm Beach Code of Ordinances (the "Code"), Trump Properties LLC ("Trump" or "Appellant") hereby appeals to the Town Council a certain June 25, 2008 decision of the Architectural Review Commission ("ARCOM") regarding the residence at 515 North County Road, Palm Beach, Florida (the "Residence").

Statement of Facts

Trump purchased the Residence on January 6, 2005. The Residence was subject to an Agreement between the Town of Palm Beach and the prior owner, Abraham Gosman, dated January 31, 1990 and recorded in Official Records Book 6350, Page 1207, of the Public Records of Palm Beach County, Florida ("Agreement"). The Agreement provides that a hedge contiguous to North County Road will be maintained and that in the event the hedge is damaged or destroyed, it will be replaced. The Agreement refers to the "hedge" in 9 separate places on the first page of the Agreement. The Agreement nowhere refers to, or requires, any trees.

On April 7, 2008 the Town gave notice of a code violation alleging that the hedge had not been maintained or replaced. The original hedge had been destroyed by the hurricanes of 2005 and two subsequent replacement hedges had died due to salt spray. Therefore, Trump asked to replace the ficus hedge with silver buttonwood hedge material. The Town staff advised that such decision would have to be made by ARCOM. The Appellant appeared before ARCOM on May 28, 2008. ARCOM approved silver buttonwood hedge material. ARCOM also requested that trees be planted and requested a tree planting plan. Trump planted the hedge in accordance with the Agreement.

Trump returned to the Code Enforcement Board meeting on June 19, 2008. That Board deferred further consideration of the matter pending plantings requested by ARCOM.

Trump appeared before ARCOM on June 25, 2008 and (a) sought reconsideration of the request for trees and (b) proved that the hedge that had been planted satisfactorily screened the house and complied with the terms of the Agreement.

Grounds for Appeal

The action of ARCOM was inconsistent with and not in conformity with the provisions of the Code and the Agreement which ARCOM and the Code Enforcement Board seek to enforce. The grounds for appeal include the following:

1. ARCOM erroneously interpreted the Agreement to require not only a hedge as specified by the Agreement, but to also require the planting of 20 trees behind the hedge. The Agreement does not require any planting of trees.

2. ARCOM denied the request by Trump to reconsider its position that trees must be planted.

3. ARCOM directed that the portion of the existing hedge which was undamaged, located north of the driveway into the property, be partially or fully destroyed and replaced with silver buttonwood hedge material for purposes of "symmetry". Such a requirement is not in conformity with the Agreement.

4. ARCOM abused its discretion in denying Appellant's request since it is unreasonable to require new and additional planting outside of the clearly limited requirements of the Agreement.

5. Any action by the Code Enforcement Board or ARCOM with regard to the Agreement is improper and inconsistent with the Town Code since the Code Enforcement Board can only enforce Code provisions and not contractual agreements, notwithstanding any language to the contrary in the Agreement.

Trump requests that this appeal be heard by the Town Council at the meeting on August 11, 2008.

TRUMP PROPERTIES LLC

By: ______________________
Bernard Diamond, Vice President

TOWN OF PALM BEACH

POLICE DEPARTMENT

A NATIONAL AND STATE ACCREDITED LAW ENFORCEMENT AGENCY

CODE ENFORCEMENT BOARD MINUTES
2:00 P.M. THURSDAY, April 17, 2008
AT THE TOWN COUNCIL CHAMBERS, 360 S. COUNTY ROAD

I. **Call to Order**: The meeting was called to order at 2:00 p.m. by Chairman Timothy Hoffman.

II. **Roll Call:**

Present:
Timothy Hoffman, Chairman
Harris S. Fried, Vice-Chairman
Joel P. Koeppel, Member (*arrived late, missed roll call*)
Larry Ochstein, Member
Catherine M. Duemler, Member
Madelyn Greenberg, Member
Cynthia Van Buren, Member
James M. Ballentine, Jr., Alternate Member
William P. Vanneck, Alternate Member

Staff:
John Randolph, Town Attorney
Captain Kirk Blouin, Support Services
Sgt. Curtis Krauel, Code Enforcement
Rob Walton, Lead Code Enforcement Officer
Nick Gerry, Code Enforcement Officer
Bryant Weymer, Code Enforcement Officer
Raychel Houston, Recording Secretary

Mr. Hoffman extended his welcome to the new members of the Board, Mr. Ballentine and Mr. Vanneck and congratulated Ms. Greenberg, Ms. Van Buren and Mr. Koeppel on their re-appointment. He also acknowledged with appreciation the job that Captain Hess had done in assisting the Board through the transition from Planning, Building and Zoning to the Police Department and congratulated him on his promotion. Mr. Hoffman introduced Sgt. Curtis Krauel, who is assuming Captain Hess's duties and will be presenting the cases for the Town. Mr. Hoffman also acknowledged the presence of Councilman Kleid in the audience and thanked him for his interest.

Mr. Hoffman designated Mr. Ballentine to vote in the absence of Mr. Koeppel. He then requested Mr. Randolph assume control of the meeting for the purpose of election of officers.

III. Election of Officers

Mr. Randolph asked for nominations for the position of Chairman. Ms. Van Buren and Ms. Greenberg jointly nominated Mr. Hoffman for the position of Chairman. There were no other nominations. Mr. Randolph asked for a motion to declare a unanimous ballot in favor of Mr. Hoffman as Chairman.

MOTION BY MS. GREENBERG
SECONDED BY MR. FRIED
MOTION PASSED UNANIMOUSLY

(*Mr. Koeppel arrived at the meeting just after the vote for Chairman*)

Mr. Randolph opened the floor for nominations for Vice Chairman. Ms. Van Buren nominated Mr. Fried and the nomination was seconded by Ms. Greenberg. Mr. Ochstein nominated Mr. Koeppel. A ballot was passed around and Mr. Randolph asked that it be initialed by the voting member. Mr. Hoffman informed Mr. Ballentine that since Mr. Koeppel was now present, he would resume being an alternate for the remainder of the meeting.

Mr. Fried was voted in as Vice Chairman by member ballot and congratulated by Mr. Hoffman.

IV. Approval of the Minutes of March 20, 2008:

MOTION BY MS. DUEMLER FOR APPROVAL OF THE MARCH 20, 2008 MINUTES
MOTION SECONDED BY MR. KOEPPEL
MOTION PASSED UNANIMOUSLY

V. Administration of the Oath to all persons who wish to testify:

Let the record show that all persons wishing to testify were sworn in at this time by Recording Secretary Raychel Houston.

VI. Public Hearings:

A. Case # 08-2431, 434 Seaspray Ave., Christopher Kaufman
Violation of Chapter 42, Section 42-87 of the Town of Palm Beach Code of Ordinances, accumulation of discarded, unusable material on property.

Lead Code Enforcement Walton said this case had been postponed from a previous meeting and he was requesting a further postponement until the May 15, 2008 Code

Enforcement Board meeting because the homeowner had applied to ARCOM and was seeking Town Council approval. Those hearings will be in May.

MOTION BY MR. OCHSTEIN TO POSTPONE THIS CASE UNTIL May 15, 2008.
SECONDED BY MS. GREENBERG
MOTION PASSED UNANIMOUSLY

. B. Case # 08-2478, 151 Chilean Ave., E. Nordin Gilbertson
Violation of Chapter 134, Section 134-889 of the Town of Palm Beach Code of Ordinances, commercial use of land in the R-B low density residential district.

Code Enforcement Officer Gerry presented the facts of this case and said the complaint had been received from a tenant of an adjacent property owner. He said there had been no response from Mr. Gilbertson with the exception of a letter which was received today and was included in the packet of case information given to the Board members. The Board took a few minutes to review the letter.

(*While this review was taking place, Mr. Hoffman acknowledged the presence of Councilwoman Coniglio in the audience and expressed his appreciation for her attendance.)*

Mr. Gerry said the Town's recommendation was that the violator be found in non-compliance, administrative costs of $150.00 assessed and that the yard be restored, the brick pavers removed and parking of vehicles from a commercial zoned property no longer be allowed at this location. Mr. Gerry said Mr. Gilbertson could obtain zoning approval and building permits for the brick pavers but it would have to be related to residentially permitted uses allowed for that particular property. He requested compliance by May 1, 2008. Ms. Van Buren said she did not see anything in Mr. Gilbertson's letter that addressed this particular violation. She then asked Mr. Randolph if prior outstanding fines could be discussed and Mr. Randolph said only if it related to this particular violation. He said this violation should be considered on its own merit. Mr. Gerry said there was an existing fine still running on the property for other violations that were still not in compliance. Ms. Duemler asked if there was a lien against the property and Mr. Randolph advised that if the previous Board order had been recorded, there was a lien against the property. It was confirmed the previous Board order had been recorded and there was an existing lien on the property. Mr. Randolph questioned whether the property was homesteaded and said if it was, foreclosure would not be an option. Mr. Gerry said the property was homesteaded.

MOTION BY MR. FRIED TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS OF $150.00 AND GIVE

THE VIOLATOR UNTIL MAY 1, 2008 TO COMPLY.

SECONDED BY MS. DUEMLER
MOTION PASSED UNANIMOUSLY

C. Case # 08-2479, 2299 E. Ibis Isle Road, 2299 E. Ibis Isle Road LLC
Violation of Chapter 42, Section 42-86 of the Town of Palm Beach Code of Ordinances, unsightly, unsafe or unsanitary conditions not allowed and properties to be maintained in good condition.

Code Enforcement Officer Gerry also presented the facts of this case and said the violation had been discovered in his normal routine patrol of the area. The property owner was cited and given until April 10, 2008 to come into compliance. He said the property owner had been cited previously on March 23, 2006, October 30, 2007 and November 14, 2007 but had not been brought before the Code Enforcement Board because the owner would come into compliance prior to the date given. He said the Town's recommendation is a finding of non-compliance, administrative costs of $150.00 and the violator given until April 19, 2008 to come into compliance.

MOTION BY MR. FRIED TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS OF $150.00 AND GIVE THEM UNTIL APRIL 19, 2008 TO COME INTO COMPLIANCE.
SECONDED BY MS. GREENBERG
MOTION PASSED UNANIMOUSLY

D. Case # 08-2480, 1089 S. Ocean Blvd., Leonard Schneider
Violation of Chapter 122, Section 122-53 of the Town of Palm Beach Code of Ordinances: the Town Council authorizes the Director of Public Works to order curtailment of the use of water for certain nonessential purposes including specifying certain days and hours when lawns and shrubbery may be watered.

Code Enforcement Officer Weymer said this case concerned a water violation. A written warning had been issued for a violation which occurred on March 15, 2008. A second violation then occurred on March 29, 2008 at 11:33 a.m. and the notice was issued by certified mail. The fine had been paid this morning so the Town recommends a finding of non-compliance, acceptance of the payment of the fine and no further action be taken.

MOTION BY MS. GREENBERG TO FIND THE VIOLATOR IN NON-COMPLIANCE, ACCEPTANCE OF THE PAYMENT OF THE FINE AND NO FURTHER ACTION TAKEN.
SECONDED BY MR. FRIED
MOTION PASSED UNANIMOUSLY

E. Case # 08-2481, 247 Chilean Ave., Frederick W. Hoberg

Violation of Chapter 42, Section 42-87 of the Town of Palm Beach Code of Ordinances, all exterior walls, gates and fences shall be kept in a safe and good state of repair.

Code Enforcement Officer Weymer presented the facts of the case and said he had received a complaint of a brick wall in disrepair. He investigated and confirmed there was a violation on the property. There was no response from the notice of code violation and hearing letter so the property was posted. The following day, Mr. Weymer received a call from the caretaker of the property who said Mr. Hoberg was out of the country and would not have been aware of any mail concerning the violation. The caretaker said he had contracted Tropical Concrete and Restoration to get the work done and the prep work had been started today. He said the Town recommends a finding of non-compliance, administrative costs in the amount of $150.00 and the violator given until May 12, 2008 to achieve compliance.

MOTION BY MR. FRIED TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS OF $150.00 AND GIVE THEM UNTIL MAY 12, 2008 TO COME INTO COMPLIANCE.
SECONDED BY MR. KOEPPEL
MOTION PASSED UNANIMOUSLY

F. Case # 08-2482, 257 Sandpiper Dr., Xcel Texas Inc.
Violation of Chapter 106, Section 106-159 (b) of the Town of Palm Beach Code of Ordinances, a clearance of 18 feet, measured from the edges of the pavement and extending the full width of all streets vertically to be maintained for the unobstructed passage of vehicles.

Code Enforcement Officer Weymer said this violation regarded an overgrown hedge but full compliance had been achieved. The Town recommends the violation be dismissed with no further action taken.

MOTION MADE BY MS. DUEMLER TO DISMISS THIS CASE
SECONDED BY MS. GREENBERG
MOTION PASSED UNANIMOUSLY

G. Case # 08-2483, 231 Nightingale Trail, 231 Nightingale Trail LLC
Violation of Chapter 18, Section 18-242 [104.1.11] of the Town of Palm Beach Code of Ordinances, any site in which reconstruction does not commence within 15 days after demolition must be irrigated and sodded or seeded and Chapter 42, Section 42-86, debris shall not be allowed to accumulate on property.

Lead Code Enforcement Officer Walton presented the facts of the case and said a demolition permit had been issued for this property on November 11, 2007 with a final inspection of February 15, 2008. There was a building permit initially issued on the site which stayed the requirement to seed and irrigate. The building permit had since been rescinded by the contractor which meant it was no longer a construction site and the lot had to be maintained. He had numerous meetings with the property owner and the property manager who was present to speak today if necessary. Mr. Walton said that as of yesterday, an irrigation system had been installed and the property had been hydro-seeded. They are now in compliance with the ordinance. The violation was not corrected prior to the time specified but was corrected prior to the hearing. The Town recommends the Board find the violation occurred but has been corrected, assess administrative costs in the amount of $150.00 and no further fines be imposed and the case closed.

MOTION BY MS. DUEMLER TO FIND THE VIOLATION OCCURRED BUT HAS BEEN CORRECTED AND ASSESS ADMINISTRATIVE COSTS OF $150.00
SECONDED BY MR. KOEPPEL
MOTION PASSED UNANIMOUSLY

H. Case # 08-2484, 515 N. County Road, Trump Properties, LLC
Violation of Chapter 18, Section 18-205 of the Town of Palm Beach Code of Ordinances, the Architectural Commission may attach conditions to any approval it grants (Declaration of Use Agreement).

Lead Code Enforcement Walton presented the facts of the case and said the previous owner of the property, Abe Gosman, had been granted approval by the Architectural Commission to do some remodeling. One of the conditions of this approval was that the hedge along the front of the property be maintained in the condition it was in at the time the approval was granted. This agreement was a binding agreement, which passes on to any subsequent property owner. The agreement was made January 31, 1990. The subsequent buyer of this property was Mr. Trump, Trump Properties, LLC and some remodeling work was done, removing the previous hedge. A new hedge was planted to replace the original hedge and that one has now been removed. This is a violation of the agreement. A letter was received from Mr. Royce, representing Mr. Trump, asking for a postponement of today's hearing. The Town does not feel this matter should be postponed.

Mr. Randolph summarized the letter from Mr. Royce which indicated the ficus hedge keeps dying and they want to replace it with something different. They plan on hiring a landscape architect to go before the next Architectural Commission meeting to get approval to install a hedge in an attempt to meet the conditions of the declaration of use agreement. Mr. Randolph said he had discussions with Mr. Royce and Mr. Walton and Mr. Royce was told the Town could not recommend a postponement and the recommendation would be that they are found in violation, assessed the $150.00

in administrative costs and be given until June 18th, which is the day before the June Code Enforcement Board meeting, to comply. This would give them the opportunity to appear before the Architectural Commission to see if they can get approval to re-plant a hedge. The hedge has to be installed to the height which existed at the time of the agreement which Mr. Randolph said he believed was twenty-two (22) feet. Mr. Randolph said Mr. Royce was not present today because he had a planned vacation.

MOTION BY MR. FRIED TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS OF $150.00 AND GIVE THEM UNTIL JUNE 18, 2008 TO COMPLY.
SECONDED BY MS. VAN BUREN
MOTION PASSED UNANIMOUSLY

I. Case # 08-2485, 137 Root Trail, T&P Pavers
Violation of Chapter 18, Section 18-242 of the Town of Palm Beach Code of Ordinances, working without a permit.

Lead Code Enforcement Officer Walton presented the facts of the case and said he had received a faxed letter today from T&P Pavers, advising they had spoken with the Acting Building Official, Jeff Taylor, who had reportedly told them a permit was not required because the job was so small. Mr. Walton said he had not been able to contact Mr. Taylor who was in a class all day so Mr. Walton requested this case be posted until the May 15, 2008 meeting.

MOTION BY MR. KOEPPEL TO POSTPONE THIS CASE UNTIL May 15, 2008.
SECONDED BY MS. GREENBERG
MOTION PASSED UNANIMOUSLY

J. Case # 08-2486, 1473 N. Ocean Blvd., Elias Management & Construction, Inc.
Violation of Chapter 42, Section 42-198 of the Town of Palm Beach Code of Ordinances, sandblasting during season.

Code Enforcement Officer Weymer presented the facts of the case and said the fine of $250.00 had been paid prior to today's meeting. He said the Town recommended a finding of non-compliance, acceptance of the payment of the fine and no further action be taken.

MOTION BY MS. DUEMLER THAT THE VIOLATION BE FOUND IN NON-COMPLIANCE, ACCEPTANCE OF THE PAYMENT OF THE FINE AND NO FURTHER ACTION TAKEN.
SECONDED BY MR. KOEPPEL
MOTION PASSED UNANIMOUSLY

K. Case # 08-2487, 1060 N. Ocean Blvd., George Brittain Land Design

Violation of Chapter 42, Section 42-230 of the Town of Palm Beach Code of Ordinances, leaf blower over 65 DBA.

Code Enforcement Officer Weymer presented the facts of the case and said the violation occurred on March 18, 2008 in front of 1060 N. Ocean Blvd. He said he had issued a previous written warning to the company on Feb. 22, 2008. The violation carries a fine of $125.00 for the first offense and the fine had been paid prior to the start of today's hearing. The Town recommends a finding of non-compliance, acceptance of the payment of the fine and no further action taken.

MOTION BY MR. KOEPPEL TO FIND THE VIOLATOR IN NON-COMPLIANCE, ACCEPT THE PAYMENT OF THE FINE AND NO FURTHER ACTION TAKEN.
SECONDED BY MS. GREENBEREG
MOTION PASSED UNANIMOUSLY

VII. Old Business:

A. Case # 06-2049, 1742 S. Ocean Blvd., Gunther E. Lehman
Violation of Chapter 42, Section 42-87 of the Town of Palm Beach Code of Ordinances, all exterior walls, gates and fences shall be kept in a good state of repair.

Lead Code Enforcement Officer Walton presented the facts of this case and said they are essentially the same as case # 06-2050. The Board had previously heard the cases which concerned a wall which split the property line between the two properties. Both properties were found in non-compliance and there was dissention about whose wall it was and who was responsible for the repairs. Each property owner has repaired the portion of the wall which belongs to them and the Town is requesting the cases be dismissed.

MOTION BY MR. KOEPPEL TO DISMISS THE CASE
SECONDED BY MR. FRIED
MOTION PASSED UNANIMOUSLY

B. Case # 06-2050, 1744 S. Ocean Blvd., Norman Traverse
Violation of Chapter 42, Section 42-87 of the Town of Palm Beach Code of Ordinances, all exterior walls, gates and fences shall be kept in a good state of repair.

MOTION BY MR. KOEPPEL TO DISMISS THE CASE
SECONDED BY MS. DUEMLER
MOTION PASSED UNANIMOUSLY

C. Case # 07-2097, 333 Sunset Ave., Royal Poinciana South

Violation of Chapter 134, Section 134-416 (d), Section 134-417 and Section 134-418 of the Town of Palm Beach Code of Ordinances, when any building or structure or part thereof which is nonconforming is altered, changed or replaced, the non-conforming building or structure or part thereof shall thereafter conform to the regulations of the district in which such building or structure is located and the terminated nonconformity shall not thereafter be resumed nor shall any additional nonconformity be permitted.

Lead Code Enforcement Officer Walton said this case had previously been heard and was remanded back to the Code Enforcement Board by the Circuit Court. The case has been previously postponed due to the attorneys for 333 Sunset Ave. being on vacation. Mr. Walton said the Town is asking that the case be postponed again because Mr. Castro, the Zoning Administrator, could not be present today.

MOTION BY MR. KOEPPEL TO RESCHEDULE THE CASE UNTIL MAY 15, 2008
SECONDED BY MS. GREENBERG
MOTION PASSED UNANIMOUSLY

Mr. Hoffman addressed a question to Sgt. Krauel or Lead Code Enforcement Officer Walton as to whether people were starting to pay more attention to Code Enforcement or perhaps fewer violators were found this month. Mr. Walton said the Town was getting better compliance and perhaps these agendas would be even shorter in the future. He said the word was out that not only were the Code Enforcement officers looking harder but the Board is not being as generous with the time but still being fair. Mr. Hoffman said he needed to compliment the Town Council on their efforts to make Code Enforcement an important part of making the community a more habitable place. He said he also wanted to compliment the Staff for doing that for the Town.

Captain Blouin said when Code Enforcement was first transferred to the Police Department, things were structured a little differently. In the past, it had been treated more leniently. The citizens did not take it seriously because they believed they were going to keep getting more time. He said some of the earlier cases when the Police Department took over were more than a year old when they came before the Board. The police department changed it so the cases are before the Board more quickly. Many of the attorneys who were known to defend the code violation type of cases initially were very combative. That attitude has now changed and they are contacting the Police Department to see what they need to do to come into compliance. Captain Blouin said he wanted to thank the Board for their efforts in making this happen within the community because it is making code enforcement more efficient in the Town.

Mr. Fried complimented the Staff on the packets of photographs being put together for the Board, that it makes their analysis and discussion more effective and more efficient.

VIII. Fine Consideration:

A. Case # 08-2432, Beachfront Vista Property, Nightingale Beach Club Association
Violation of Chapter 134, Section 134-1472 (3) of the Town of Palm Beach Code of Ordinances, no additional walls, fences, hedges or other structures or growth shall be erected or be grown eastwardly of Ocean Boulevard to a height greater than four (4) feet above the surface of the Ocean Boulevard.

Lead Code Enforcement Officer Walton said this case had been postponed from a previous meeting as a permit had been applied for per the Board's order. He said he had received an e-mail yesterday from John Wettstein, who is with the State of Florida. Mr. Wettstein's e-mail said a permit must be issued or denied by the State by June 13, 2008. The case is still under review so Mr. Walton requested a postponement until June 19, 2008. Mr. Hoffman requested that date be June 18th, as the Code Enforcement Board hearing is June 19, 2008. Mr. Randolph said it is possible the permit could be issued by the May meeting. Mr. Walton revised his request to postpone to the May 15, 2008 meeting and said if there had been no decision at that time, he would ask for another postponement.

MOTION BY MR. KOEPPEL TO POSTPONE THE CASE UNTIL THE MAY 15, 2008 MEETING
SECONDED BY MR. FRIED
MOTION PASSED UNANIMOUSLY

B. Case # 08-2470, 2252 W. Ibis Isle Road, Walter Jackson
Violation of Chapter 42, Section 42-86, of the Town of Palm Beach Code of Ordinances, properties are required to be maintained in good condition and unsightly, unsafe or unsanitary conditions are not permitted and Chapter 42, Section 42-87, all exterior walls to be maintained in good repair and roofs to be maintained so as not to leak.

Lead Code Enforcement Officer Walton said the Board had issued an order at the last hearing that the violator was found in non-compliance, ordered to pay administrative costs of $150.00 and given until April 14, 2008 to comply. Mr. Jackson has tried to come into compliance and there have been major improvements in the property. There are a few outstanding items and Mr. Walton said Mr. Jackson's contractor is asking for a 7 day extension to come into compliance. Dennis Perkins, the contractor was present and told the Board he would be able to have the property in compliance by April 24, 2008.

MOTION BY MS. GREENBERG TO GIVE THE VIOLATOR AN EXTENSION OF TIME UNTIL APRIL 24, 2008 TO COMPLY
SECONDED BY MS. VAN BUREN
MOTION PASSED UNANIMOUSLY

C. Case # 08-2471, 240 Park Avenue, Park Avenue Palm Beach LLC
Violation of Chapter 42, Section 42-86, of the Town of Palm Beach Code of Ordinances, properties are required to be maintained in good condition and unsightly, unsafe or unsanitary conditions are not permitted and Chapter 42, Section 42-87, all exterior walls to be maintained in good repair and interior walls and ceilings shall be structurally sound.

Lead Code Officer Walton advised this property had been found in non-compliance at the last hearing, assessed administrative costs in the amount of $150.00 and given one (1) day to comply. Compliance has not been achieved so the Town recommends a $250.00 a day fine. He said he has met with the Chief Financial Officer of the corporation that owns the property and that individual was present today to address the Board.

Dan Gorman was sworn in by Recording Secretary Houston and said he had become aware of this violation after the fact. He said they had been going back and forth with the Town about what to do with the property at 240 Park Ave. He said it was a disheveled rooming house when they took it over and they began to rebuild it to its old glory. As recently as three weeks ago, an associate of his met with the Town to discuss whether to continue to do the eighteen room hotel/boarding house or convert it into a single family residence. As a result of that, the original permits lapsed. They then went to the Bahamas to work on another project and did not get the notices. They have a new group of contractors, Principal Design and Development Building, who are going to re-file the permits. He requested an extension of time as they have done everything they can without permits. Mr. Walton said the Town was requesting a fine of $250.00 a day to begin on March 22, 2008. In response to questions from Board members, Mr. Gorman said they had decided to continue with the rooming house zoning and they had consultants and financing in place. He anticipated the project, at least the exterior, would be completed within 30 days and the interior portion, three to four months after that.

Mr. Hoffman advised he was not in favor of granting any extensions in this case and Mr. Ochstein agreed.

MOTION BY MR. OCHSTEIN TO IMPOSE A FINE OF $250.00 A DAY, COMMENCING ON MARCH 22, 2008 AND CONTINUING UNTIL COMPLIANCE IS ACHIEVED.
SECONDED BY MS. DUEMLER

There was some discussion on the motion and Mr. Koeppel requested it be amended to include a reconsideration of the fine based on how much progress was made and how they proceeded in getting it completed. Mr. Ochstein did not object.

AMENDED MOTION BY MR. OCHSTEIN TO IMPOSE A FINE OF $250.00 A DAY, COMMENCING ON MARCH 22, 2008 AND CONTINUING UNTIL COMPLIANCE IS ACHIEVED, SUCH FINE TO BE RECONSIDERED BASED ON PROGRESS OF COMPLETION
SECONDED BY MS. DUEMLER
MOTION PASSED UNANIMOUSLY

D. Case # 08-2477, 215 Colonial Lane, Susan C. Lee Trust

Violation of Chapter 42, Section 42-87 of the Town of Palm Beach Code of Ordinances, swimming pools and gates to be kept in a good state of repair, roof maintained so as not to leak, exterior surfaces to be kept in a good state of repair, no conditions allowed which provides harborage for vermin and Chapter 18, Section 18-551, fences and gates for swimming pools to be not less than four (4) feet in height and gates to be self-closing and self-latching.

Lead Code Enforcement Officer Walton advised he had broken the seven (7) violations in this case down to two classifications, (A) which was violations 1,2 and

3, which concerned the pool and (B) which were violations 4, 5, 6 and 7. The violator was out of compliance four (4) days for (A), violations 1, 2 and 3 for which the Town was requesting a fine of $100.00 a day for each of the four days out of compliance. The violator had been given until April 14, 2008 to come into compliance for (B), violations 4, 5, 6 and 7 but these violations were still outstanding. The Town requests a fine of $250.00 a day commencing on April 15, 2008 and continuing until compliance is achieved.

Amy Fischer was present on behalf of the homeowner, along with Mr. Lawrence, an architect who she said was assisting them in trying to remedy the problems which had turned out to be more extensive than they had anticipated. She detailed the problems with obtaining the proper roofer and the time frame involved. Some of the issues involved code changes and whether or not the roof could be replaced with a similar system or whether it had to be upgraded to meet certain hurricane requirements. Some of the issues had been taken care of immediately but it was not feasible to remediate some of the problems in the time constraints the Town had afforded them. Ms. Fischer requested this matter be continued for forty-five (45) days or they be given a forty-five (45) day window to come into compliance. She said they had problems with contractors who had not done things in an expeditious, correct manner.

Mr. Lawrence was sworn in by Recording Secretary Houston and said he had nothing to add other than that patching was not an option and the roof had to be replaced.

MOTION BY MR. FRIED TO ASSESS A FINE IN THE AMOUNT OF $100.00 A DAY FOR FOUR (4) DAYS FOR VIOLATIONS (A) FOR A TOTAL OF $400.00 AND A FINE IN THE AMOUNT OF $250.00 A DAY FOR VIOLATIONS (B), COMMENCING ON APRIL 15, 2008 AND CONTINUING UNTIL COMPLIANCE IS ACHIEVED.
SECONDED BY MR. OCHSTEIN

During discussion on the motion, Mr. Fried told Ms. Fisher that although they appreciated her testimony, fines had a way of giving people incentive and it was in the Board's discretion to reconsider the fine if compliance was done in an appropriate time. Mr. Koeppel said he was going to make a similar comment especially in a case such as this one where one form of repair was anticipated and it became something significantly different. He thought the Board needed to take that into consideration.

MOTION PASSED UNANIMOUSLY

IX. Comments:

Mr. Fried said he wanted to revisit the subject Mr. Raffo had enjoyed so much over the past couple of months, regarding outstanding fines. He requested an update on the progress made in collecting some of them. Ms. Houston advised the outstanding water restriction fines had been reduced to $6400.00 this month from over $9000.00 due the previous month and liens were in the process of being filed for the remainder that had not been paid. The non-running fines either had liens filed or were agenda items which are pending. Cases that had substantial fines and were not homesteaded would be looked at for foreclosure proceedings. The list of the daily running fines indicated which of those properties were homesteaded and Ms. Houston indicated she anticipated bringing some of those non-homesteaded properties to the Board for foreclosure consideration next month.

Mr. Fried asked about the motion made by Mr. Raffo at the last meeting, requesting the Town Council to address the issue of giving final authority for foreclosure action to the Code Enforcement Board. He asked for an update from Mr. Randolph or Ms. Houston as to whether this would appear on the Town Council agenda. Mr. Randolph asked if the minutes of that last meeting had been sent to the Town Council and Ms. Houston told him those were the minutes that had just been approved today by the Board so they would now be sent to the Town Council. Mr. Randolph said since these minutes had now been approved, he would go ahead and call them to the attention of Peter Elwell and ask him to agenda it on the next meeting of the Council. Mr. Fried asked that the outstanding fines be prioritized for foreclosure starting with the largest ones first. Ms. Houston said she would address the oldest and the largest outstanding fines first. She said she had also waited, based on the motion from the last meeting because it would be a different procedure if it was just brought to the Code Enforcement Board for approval or if it came to them for final action. Mr. Randolph said it was his understanding that the Code Enforcement Board wanted final approval as set forth in State Statute rather than just recommending foreclosure to the Town Council. Captain Blouin advised he also needed to speak to Mr. Randolph to get a prudent cutoff for what cases would be brought for foreclosure in terms of dollar amount.

Mr. Ballentine said he was intrigued by the leaf blower case and asked Captain Blouin how it was monitored in the Town. Captain Blouin said in November of last year, the Police Department had queried the most common types of complaints they were receiving and most were about construction or landscape noise. It was decided to focus most of his resources, which were generally small, outside of the police officers, whose main focus is keeping the community safe, not code violations. The department started with an educational campaign for the landscape industry, consisting of brochures outlining all of the ordinances which applied to them and voluntary testing of their equipment. He said the last time he had checked, 89 warnings had been written but he did not recall how many violations. Most of the violations would not come before the Code Board because the violator has the option of paying a fine or if they want to contest it, to come before the Code Board. Some people have just elected to pay the fine. All of the major landscapers are going to be contacted again and two more testing dates have been set up. The code enforcement officers have been told this is a priority because of the complaints from the citizens. Captain Blouin said that even if everyone was in compliance with the ordinance, it was still going to be a nuisance to some citizens because leaf blowers are noisy.

Ms. Greenberg asked Mr. Randolph if it could be discussed if someone had a prior history of violations. Mr. Randolph said the case before them should be considered on the merits, not on the prior history. He said it could become relevant in considering the amount of a fine.
There was discussion about the Susan Gibson and the Susan Lee Trust and the outstanding fines on those cases.

X. Adjournment:

The meeting was adjourned without benefit of a motion.

TOWN OF PALM BEACH
POLICE DEPARTMENT
A NATIONAL AND STATE ACCREDITED LAW ENFORCEMENT AGENCY

CODE ENFORCEMENT BOARD MINUTES
2:00 P.M. THURSDAY, JULY 17, 2008
AT THE TOWN COUNCIL CHAMBERS, 360 S. COUNTY ROAD

I. **Call to Order**: The meeting was called to order at 2:00 p.m. by Chairman Timothy Hoffman.

II. **Roll Call:**

Present:
Timothy Hoffman, Chairman
Harris Fried, Vice Chairman
Larry Ochstein, Member
Catherine M. Duemler, Member
Madelyn Greenberg, Member
Cynthia Van Buren, Member
James M. Ballentine, Jr., First Alternate
William P. Vanneck, Second Alternate

Absent:
Joel P. Koeppel, Member

Staff:
John Randolph, Town Attorney
Captain Kirk Blouin, Support Services
Rob Walton, Lead Code Enforcement Officer
Nick Gerry, Code Enforcement Officer
Bryant Weymer, Code Enforcement Officer
Raychel Houston, Recording Secretary

III. Approval of the Minutes of June 19, 2008:

MOTION BY MS. DUEMLER FOR APPROVAL OF THE JUNE 19, 2008 MINUTES
MOTION SECONDED BY MS. GREENBERG
MOTION PASSED UNANIMOUSLY

IV. Administration of the Oath to all persons who wish to testify:

Let the record show that all persons wishing to testify were sworn in at this time by Recording Secretary Raychel Houston.

V. Public Hearings:

A. Case # 08-2431, 434 Seaspray Ave., Christopher Kaufman
Violation of Chapter 18, Section 18-242, Subsection 1 (104.1.1) of the Town of Palm Beach Code of Ordinances, building permits required to construct, install, repair or alter any building or building system.

Lead Code Enforcement Walton requested the case be postponed until a date certain of September 18, 2008 as Mr. Kaufman has a hearing before the Town Council.

MOTION BY MS GREENBERG TO POSTPONE THE CASE UNTIL SEPTEMBER 18, 2008
SECONDED BY MR. OCHSTEIN
MOTION PASSED UNANIMOUSLY

B. Case # 08-2511, 114 N. County Rd., Palm Beach Affair
Violation of Chapter 46, Section 46-68 of the Town of Palm Beach Code of Ordinances, annual fire and life safety inspection fees not paid

Code Enforcement Officer Gerry requested the case be dismissed as the fees were paid and it came into compliance.

MOTION BY MR. FRIED TO DISMISS THE CASE
SECONDED BY MS. GREENBERG
MOTION PASSED UNANIMOUSLY

C. Case # 08-2512, 235 Sunrise Ave., Suite C8, Palm Beach Resorts International
Violation of Chapter 46, Section 46-68 of the Town of Palm Beach Code of Ordinances, annual fire and life safety inspection fees not paid

Code Enforcement Officer Gerry presented the facts of the case and said the Town recommends a finding of non-compliance, administrative costs in the amount of $150.00 and payment of the fire inspection fee in addition to any late penalties by July 21, 2008. Mr. Hoffman inquired about the late penalties and Mr. Gerry said they were based on a monthly penalty of 10% per month. In response to Mr. Ochstein's question, Mr. Gerry explained that both the business and the property owner were cited. Mr. Fried inquired about service and Mr. Gerry said it was sent by certified mail. Mr. Ballentine asked if any attempts, other than by mail, were made to get in touch with someone at the business. Mr. Gerry said he went to the business, was told the owner was difficult to reach and left his business card but had not received any response.

MOTION BY MR. FRIED TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND ORDER THEM TO PAY THE FIRE INSPECTION FEE IN ADDITION TO ANY LATE PENALTIES BY JULY 21, 2008.
SECONDED BY MS. GREENBERG
MOTION PASSED UNANIMOUSLY

D. Case # 08-2513, 329 Worth Ave., Dunville L'Antiquaire, LTD
Violation of Chapter 46, Section 46-68 of the Town of Palm Beach Code of Ordinances, annual fire and life safety inspection fees not paid

Code Enforcement Officer Gerry presented the facts of the case and said he followed up after the certified letters were sent but the business could not be contacted. The Town recommends a finding of non-compliance, administrative costs in the amount of $150.00 and payment of the fire inspection fee in addition to any late penalties by July 21, 2008.

MOTION BY MS. GREENBERG TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND ORDER THEM TO PAY THE FIRE INSPECTION FEE IN ADDITION TO ANY LATE PENALTIES BY JULY 21, 2008.
SECONDED BY MS. VAN BUREN
MOTION PASSED UNANIMOUSLY

E. Case # 08-2514, 235 Sunrise Ave., C8, C.J.'s Simply Gourmet, Inc.
Violation of Chapter 46, Section 46-68 of the Town of Palm Beach Code of Ordinances, annual fire and life safety inspection fees not paid

Code Enforcement Officer Gerry presented the facts of the case and recommended a finding of non-compliance, administrative costs in the amount of $150.00 and payment of the fire inspection fee in addition to any late penalties by July 21, 2008. Mr. Gerry said he also tried, with negative results, to make contact with the owner of this business as it is the same owner as the other case at this location. Mr. Ochstein remarked that this was the same business which had been before the Board previously and had even "bounced a check" to the Town and wanted to know if there was something more that could be done other than the standard $150.00 costs. Mr. Gerry said he could review the case further to see if it could be brought back for additional fines. Mr. Hoffman asked if these cases were brought to Code Enforcement by the Finance Department and Mr. Gerry said they came from the Fire Prevention Bureau who handles their own billing and explained the procedure for that. Mr. Hoffman said it seemed like a year was a long time for these cases to be in arrears. Mr. Gerry said the cases were coming over quicker now from Fire Prevention and he thought it would improve in the future.

MOTION BY MR. OCHSTEIN TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND ORDER THEM TO PAY THE FIRE INSPECTION FEE IN ADDITION TO ANY LATE PENALTIES BY JULY 21, 2008.
SECONDED BY MR. FRIED
MOTION PASSED UNANIMOUSLY

F. Case # 08-2515, 140 N. County Rd., Bank of America
Violation of Chapter 46, Section 46-68 of the Town of Palm Beach Code of Ordinances, annual fire and life safety inspection fees not paid

Code Enforcement Officer Gerry presented the facts of the case and said he had spoken with Robin Gert who advised him the bill had been mishandled and gotten lost in their system. He said he spoke to her yesterday and was told the payment was still in process. The Town recommends a finding of non-compliance, administrative costs in the amount of $150.00 and payment of the fine inspection fee in addition to all late penalties and costs by August 4, 2008.

MOTION MADE BY MS. GREENBERG TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND ORDER THEM TO PAY THE FIRE INSPECTION FEE IN ADDITION TO ANY LATE PENALTIES BY AUGUST 4, 2008.
SECONDED BY MS. DUEMLER
MOTION PASSED UNANIMOUSLY

G. Case # 08-2516, 313 ½ Worth Ave., # B2, David Clark
Violation of Chapter 114, Section 114-32 of the Town of Palm Beach Code of Ordinances, business tax receipt required

Code Enforcement Officer Gerry presented the facts of the case and said Mr. Clark had submitted his paperwork and paid the fee but there was a zoning issue still in question. The Zoning Administrator is out of the office this week on jury duty and based on the inability to get the issue resolved, the Town recommends the case be postponed until the August 21, 2008 hearing date.

Mr. Fried questioned what the zoning issue had to do with a business tax receipt and Mr. Gerry said the Town records do not show this particular suite existing at this address but Mr. Clark has documents showing it there.

Mr. Gerry said zoning is tied into business tax receipts because zoning requirements do not allow certain businesses in some districts. There is also the question of whether the space is legitimate because people will subdivide suites and make two spaces where there should only be one. Mr. Gerry said it looked like a legal space from the documentation Mr. Clark provided but the Zoning Administrator needed to approve it.

MOTION BY MR. FRIED TO POSTPONE THE CASE UNTIL AUGUST 21, 2008
SECONDED BY MS. VAN BUREN
MOTION PASSED UNANIMOUSLY

H. Case # 08-2517, 2270 E. Ibis Isle Road, Mark Remson Trust
REPEAT Violation of Chapter 42, Section 42-86 of the Town of Palm Beach Code of Ordinances, Environment, properties to be maintained in a good condition.

Code Enforcement Officer Weymer presented the facts of the case and said the violation was discovered from routine patrol in the area but shortly after the notice of repeat violation was sent out, a citizen complaint was received as well. Mr. Weymer said there had been at least seven previous letters to this property owner regarding lack of maintenance on the property. A repeat notice of code violation was mailed out on June 24, 2008 with a mandatory hearing date. The lot was cut on or around July 2, 2008. This particular violation is a Class II violation under the fine schedule which calls for a fine of $400.00, however, by law, the Board has the ability to impose a fine of up to $500.00 because it is a repeat violation. Mr. Weymer said he believes it is important to look at the track record of this property in considering the fine. The Town recommends a finding of non-compliance, administrative costs in the amount of $150.00 and a fine of $500.00, which is the maximum fine for a repeat violation.

Mr. Hoffman said it seemed that every time the property owner gets notified he comes into compliance but he has to be notified. Mr. Weymer says there are times when he comes into compliance but on at least two other occasions, he has been before the Board because he has not complied by the time set. Mr. Ochstein asked if he has been fined in the past and Mr. Weymer said there are two outstanding fines for which liens have been placed on the property.

MOTION BY MS. GREENBERG TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND A FINE OF $500.00
SECONDED BY MS. DUEMLER
MOTION PASSED UNANIMOUSLY

I. Case # 08-2518, 230 Esplanade Way, Kenneth J. Horton

Violation of Chapter 42, Section 42-86 (19) of the Town of Palm Beach Code of Ordinances, cleared land must be re-sodded or replanted to prevent the creation of windblown dust or dirt and Chapter 42, Section 42-86, unsightly, unsafe or unsanitary conditions not permitted and properties to be maintained in good condition.

Code Enforcement Officer Weymer presented the facts of the case and said the violation was discovered on routine patrol. Mr. Weymer has been in contact with a property representative, Louis Pascerelli who said Mr. Horton had not been in Town to receive his mail. Mr. Weymer said Mr. Pascerelli had proposals from Hansen Landscape for the clean up and re-sod of the lot and a weekly maintenance contract to assure this does not happen again. Tropical Irrigation has also been contacted to put in a new irrigation system. The Town recommends a finding of non-compliance, administrative costs in the amount of $150.00 and the property owner be given until August 18, 2008 to come into compliance. Mr. Fried said he believed a fine of some sort should be imposed. Mr. Ballentine asked how long Mr. Horton had been out of compliance. Mr. Weymer said the original warning was sent on June 5, 2008 and a notice of violation and hearing was sent on June 20, 2008. Mr. Weymer said the first contact with the property owner was July 7, 2008. Mr. Ballentine asked if the August compliance date was reasonable and Mr. Weymer said Jim Hansen of Hansen Landscape thought the work would be done before that date but wanted more time in case he ran into any problems.

MOTION BY MR. FRIED TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND GIVE HIM UNTIL AUGUST 18, 2008 TO COME INTO COMPLIANCE.
SECONDED BY MR. OCHSTEIN
MOTION PASSED UNANIMOUSLY

J. Case # 08-2519, 206 Dunbar Road, AMF Estate Management
Violation of Chapter 42, Section 42-230 of the Town of Palm Beach Code of Ordinances, leaf blower over 65dBA at 50 ft.

Code Enforcement Officer Weymer presented the facts of the case and said he witnessed the violation on June 26, 2008. AMF had previously been warned on February 19, 2008 for using a leaf blower over 65dBA. Mr. Weymer performed a decibel test for this violation and the reading was 79.6 dBA at 50 feet. This is a class II violation under the fine schedule which has a $125.00 fine for the first offense. The violation was issued on site to a superintendant for AMF and has not been paid. The Town recommends a finding of non-compliance, administrative costs in the amount of $150.00 and payment of the $125.00 fine.

Mr. Hoffman asked whether this company had participated in the leaf blower testing being offered by Code Enforcement. Mr. Weymer said AMF had participated in the testing program and had several leaf blowers certified. He said

the truck he was out with had 2 other leaf blowers on the truck that he could identify as being over 65dBA but he only tested the one they were using and wrote a violation for that one. Ms. Van Buren asked about the testing method and Mr. Weymer explained how it was done.

MOTION BY MR. OCHSTEIN TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND ORDER HIM TO PAY THE $125.00 FINE
SECONDED BY MS. VAN BUREN
MOTION PASSED UNANIMOUSLY

K. Case # 08-2520, 165 Brazilian Ave., Richard Lynn

Violation of Chapter 10, Section 10-45 (i) of the Town of Palm Beach Code of Ordinances, if any dog attacks and causes severe injury or death to any human or domestic animal more than once, the owner shall be required to have said dog removed from the Town or humanely euthanized at his/her sole expense and violation of Chapter 10, Section 10-6 of the Code which prohibits animals from creating nuisances which are detrimental to the public safety and welfare.

(Mr. Ochstein recused himself, stating that he has a relative who has a business relationship with Dr. Lynn and Mr. Hoffman advised Mr. Vanneck would be a voting member in this case)

Sgt. Curtis Krauel said this case was brought to Code Enforcement through a culmination of events spanning back over a period of 4 years. Sgt. Krauel explained Section 10-6 of the Code and said he was going to be showing some graphic photographs. Sgt. Krauel presented the facts of each of the documented cases involving attacks by Duke from March 17, 2004 until May 11, 2008.

Mr. Hoffman questioned how the Code Enforcement Board came into this procedure since the Town Council had already said Duke is a dangerous dog. Mr. Randolph explained that Town Council does not have the authority to fine. Originally, the police department did not issue a code enforcement board citation but ordered the dog be removed from the Town or humanely euthanized which was appealed to Town Council. Town Council denied the appeal. Since that time, Dr. Lynn has refused to comply with the order of the Town Council so a citation was issued by Code Enforcement to bring the matter before the Board to determine whether there should be a finding of violation and at a later time, whether a fine should be imposed. Mr. Randolph said it was now the jurisdiction of the Code Enforcement Board and not the Town Council. Mr. Hoffman questioned whether or not the Board had to determine if the dog was going to be euthanized or removed from the Town and Mr. Randolph explained that this was not the Board’s determination. The Board was only to determine whether or not there had been a violation of the Town Code.

Sgt. Krauel continued his presentation remarking that once Duke had been found "potentially dangerous" by Animal Care and Control, there had been another attack but due to an administrative error by Animal Care and Control in failing to document their records appropriately, Duke was classified as "potentially dangerous" again. This is an error that Animal Care and Control completely acknowledges.

After the last attack on May 11, 2008, Duke was taken into custody by Animal Care and Control and after a hearing, was classified as "dangerous". Sgt. Krauel noted that the hearing before Special Magistrate Earl Mallory did not classify Duke as vicious because Duke had no documented cases of attacks on humans. After this last case was reviewed by Code Enforcement, sufficient evidence was also found by the Town to classify Duke as dangerous and Dr. Lynn was notified by registered mail. Dr. Lynn appealed to Town Council and that appeal was denied by Town Council by a 5-0 vote. The Town recommends a finding of non-compliance with Chapter 10, Section 10-6 as the Town has the two required affidavits of residents of the Town occupying separate households. The Board was provided with copies of four (4) affidavits.

Sgt. Krauel then proceeded with an explanation of Chapter 10, Section 10-45 and said the Town was requesting a separate motion for a finding of non-compliance of Chapter 10, Section 10-45 (i) and that Dr. Lynn be given until July 18, 2008 to come into compliance by either removing the dog from the Town or having it humanely euthanized. If compliance is not achieved, the Town recommends a daily fine of $250.00 a day commence on July 19, 2008 and continue until compliance is achieved.

Mr. Randolph requested the Board treat these two sections of the Code separate and apart. He said the first evidence heard related to Section 10-6 (3) and involved the affidavits from the residents of the Town. Because of the dispute Dr. Lynn's attorney has with regard to the manner that Section 10-45 was applied, Mr. Randolph recommended the two Code sections not be mixed up. Mr. Randolph said he would like for the Board to first consider whether there had been a violation of 10-6 and to make a motion one way or the other with regard to the Staff's recommendation. He then requested that Section 10-45 be entertained separately after Dr. Lynn's attorney and anyone else who wanted to speak had an opportunity to do so.

Vivian Dorris, 155 Brazilian Ave., said her beagle/bassett, Charlie, was viciously attacked by Dr. Lynn's dog, Duke and she has sustained approximately $8500 in vet's bills. She said her dog will never walk properly again because of severe nerve damage. She does not feel there are enough precautions being taken for the safety of residents on Brazilian Ave. She asked that the Board take this into consideration and thanked them for their service.

Wayne Gerl, 149 Brazilian Ave., said he has two dogs and every time he exits his driveway or front yard, he has to stop and peek around and make sure the other dogs are not in the area. He said he was bitten by Duke a couple of years ago. He was talking with Dr. Lynn and the dog just reached out and bit him, tearing his pants and breaking the skin. He said he has been friends with Dr. Lynn and Margrit for many years but it was just unsafe for anybody and any animals in the area.

Bobby Goodnough said he was jogging in the area and the dog lunged at him, causing him to have to dive through a 12 foot hedge to get away from it. He said he just thought it was a matter of time before the dog got a person or a child. Sgt. Krauel asked if Mr. Goodnough had reported the incident to the police department or had a time frame of occurrence. Mr. Goodnough said he had not made a police report but it occurred about 2 years ago.

Laura Klein, 130 Seaspray Ave., said she had lived here for 12 years, having moved from Washington, D.C. for a sense of security. She said she was now in the process of installing surveillance cameras. She said she could no longer walk her dog without constantly looking around, worrying if Duke had once again escaped from the open gates. She said it is a privilege to own a dog and dog ownership and responsibility should go hand in hand. She said Dr. Lynn was issued a citation in August of 2002 for locking his dog in a car with the windows rolled up. She said she mentioned this to prove his irresponsibility. She said his voluminous file from Animal Care and Control would attest to this. She said no one was safe while Duke is in Palm Beach.

James Merola was present on behalf of Dr. Lynn and said he was present on a revised Notice of Code Violation and Hearing dated July 15, 2008. He said he was not denying there were incidents with Duke. Palm Beach County had the dog taken into custody and the hearing was held June 5, 2008. At that hearing, it was agreed upon by the County and Dr. Lynn that the dog would be classified as dangerous. The dog was classified as dangerous which required certain restrictions on the dog which Dr. Lynn complied with and the dog was returned to him. In the event Duke has another incident, pursuant to state and county law, but some reason not Town law, the dog would be taken into custody and euthanized. Mr. Merola said Dr. Lynn feels very badly about the situation and agreed with the County to do what they required. Mr. Merola said Dr. Lynn then received a letter, dated June 16, 2008 from the police department, mentioning the order of the County and stating for the first time that the Town was declaring the dog dangerous and giving him ten (10) days to appeal, which he did not. On June 20, 2008, 4 days after the dog was declared dangerous by the Town, the police department sent a second letter, citing 10-45 (i), advising that since the dog already had two incidents, they wanted it removed or euthanized. The dog had not done anything since being declared dangerous. This letter did not mention an appeal, but he sent a letter anyway, stating they did not agree with that. He said the dog was declared dangerous on June 16th, requirements were imposed and they complied with those, including the filing of a $1000 bond and they did not agree the dog should now be removed. There was a Town Council hearing on August 8th and the Council said they needed to have the dog removed or euthanized. Mr.

Merola went into detail about the requirements of 10-45 and said Dr. Lynn had complied with all of those. Then the letter of June 20th came, requiring Dr. Lynn to remove the dog or euthanize it. Mr. Merola read subsection (h) into the record and said the Code Enforcement Board did not have any jurisdiction over subsection (i) as subsection (h) just mentioned (d) through (g). The Town filed a lawsuit and he and Mr. Randolph were before Judge Hoy this morning. The Town is asking to have the dog removed or euthanized and asking for a permanent injunction, stating an emergency situation. Judge Hoy gave them a hearing at 1:30 p.m. on Tuesday where it will be determined whether the dog is a nuisance, whether 10-45 (i) even applies to the situation and if the Board has authority over 10-45 (i). If the Judge says the dog has to go, they are not going to argue with the Court but he believes they have a right to present their case. He does not believe the Town's position that the fine should start tomorrow is correct. He believes the Board can only find violations of subsections (d) through (g) of 10-45. There have been no allegations that Dr. Lynn has violated subsections (d) through (g). Mr. Merola believes it is clear that the Code Enforcement Board has no authority under (i). Mr. Merola then addressed 10-6 and said he believed that since all precautions have been taken under 10-45, the dog does not constitute a nuisance. Mr. Merola said he has an injunction relief request before the Judge to stop the Board from making this decision. Mr. Merola said Mr. Randolph has asked them to determine these two (2) ordinances separately and he does not believe 10-45 (i) is in the Board's purview, and as to the nuisance, the dog has to be a nuisance now and it is not. This is all going to be determined Tuesday and he is asking the Board to either deny the Town's recommendation because the Town cannot prove the dog is a nuisance now or reset this case until next month's hearing.

Sgt. Krauel advised he wanted to make a rebuttal to some of Mr. Merola's comments. The service of notice Mr. Merola referred to in declaring the dog dangerous was when the police department spoke with Dr. Lynn on June 12, 2008 and was told Duke was being housed at a kennel in Palm Beach County. A notice could not be served to Dr. Lynn to have him come into compliance with something he was already in compliance with. The dog was not in the Town. The police department did not find out the dog was in Town until June 20th when Laura Klein reported the dog attempted to break free of Dr. Lynn to attack her and this is when the letter was sent out requesting compliance with Section 10-45. Dr. Lynn was given the entire ordinance on June 10th, not just sections or specific acts that he needed to comply with. Duke was not on the property at that time and no notification to remove the dog from the property could be served then because the dog was not there. As far as the police department was concerned, Dr. Lynn was in compliance with the ordinance. Sgt. Krauel pointed out that the Town does not abide by the state and the county ordinances, that the Town has the ability to enforce more stringent and strict ordinances and that is what we have done here.

Sgt. Krauel said he was prepared, based on Counsel's recommendation, to recommend a motion to find Dr. Lynn in non-compliance with Section 10-6 and move to postpone 10-45 (i) until after further consideration by the Circuit Court on Tuesday. The Town recommends administrative costs in the amount of

$150.00 and a fine of $250.00 a day to start on June 19, 2008 if compliance is not achieved by June 18, 2008.

Mr. Ballentine asked for clarification on the motion and was advised by Mr. Randolph that it would be a finding of non-compliance of Chapter 10, Section 10-6, administrative costs of $150.00 and a compliance date of July 18, 2008 with a fine to be considered at the next meeting if compliance was not achieved.

Ms. Duemler said she believed that the dog, besides being a nuisance, is a threat to society and she hoped that by Tuesday the dog did not break loose from Dr. Lynn and maul some child, that she believed it is a disgrace and she supports the Town.

(*applause from the audience)*

MOTION BY MR. FRIED TO FIND DR. LYNN IN VIOLATION OF CHAPTER 10, SECTION 10-6, ASSESS ADMINISTRATIVE COSTS IN THE AMOUNT OF $150.00 AND REQUIRE HIM TO COME INTO COMPLIANCE BY JULY 18, 2008
MOTION SECONDED BY MR. BALLENTINE
MOTION PASSED UNANIMOUSLY

Mr. Randolph asked if a motion could be made to defer the consideration of violation of Chapter 10, Section 10-45 (i) until the August 21, 2008 meeting and Ms. Greenberg advised she would make that motion. Mr. Fried asked Mr. Randolph if he would explain the reason for this. Mr. Randolph said the argument had been made that 10-45 should not apply because the dog has already been deemed dangerous by the County and pursuant to the Town's Code. Mr. Randolph said he believed the argument was going to be made in court on Tuesday that it is not appropriate for the Town to move forward with regard to 10-45 (i) because that only applies to any incident that occurs after the dog has been declared dangerous. The argument has been made that Dr. Lynn has done everything he is required to do. Mr. Randolph said he hesitated to explain further if the matter was going to be deferred. Mr. Randolph said the position of Staff is that item (i) stands on its own merits, that it is not connected to 10-45 (a) through (h). It is also the position of Staff that it is appropriate to bring a violation of (i) to the Code Enforcement Board even though it does not specifically state that in 10-45 because Section 2-439, which is the citation fine schedule, sets forth all of the sections of the Code of Ordinances which can be brought before the Code Enforcement Board and 10-45 is listed. Code Enforcement has the right to bring a violation directly to the Code Enforcement Board instead of issuing the fine set forth in the fine schedule. Mr. Randolph said the Board could move forward in considering 10-45 instead of deferring it to the next meeting.

Mr. Fried commented that based on the egregious nature of what they had been presented with, he believed the Board should do everything they could to put pressure on Dr. Lynn to comply. Mr. Randolph questioned whether the Town would be requesting a separate fine of $250.00 a day for non-compliance and Sgt. Krauel said that was his recommendation, that there would be two concurrent fines running. Mr. Hoffman asked about the administrative costs and Sgt. Krauel said the Town was only asking for one.

MOTION BY MR. FRIED TO FIND DR. LYNN IN VIOLATION OF CHAPTER 10, SECTION 10-45 (i) AND REQUIRE HIM TO COME INTO COMPLIANCE BY JULY 18, 2008
SECONDED BY MS. GREENBERG
MOTION PASSED UNANIMOUSLY

Mr. Merola questioned what the order was with regard to 10-6, if it was to have the dog removed or euthanized by Friday or just to abate the nuisance. He said he needed to know what to tell Dr. Lynn what had to be done by Friday to avoid the potential fine. Mr. Hoffman said Dr. Lynn needed to either remove the dog or have it euthanized and Mr. Fried said that was his intention in making the motion.

VI. Old Business:

A. Case # 08-2484, 515 N. County Road, Trump Properties, LLC
Violation of Chapter 18, Section 18-205 of the Town of Palm Beach Code of Ordinances, the Architectural Commission may attach conditions to any approval it grants.

Lead Code Enforcement Officer Walton advised this case would be heard at Town Council on August 11, 2008 and requested the case be postponed until the August 21, 2008 hearing date. Mr. Trump's attorney and the attorney for the new purchaser were both present.

Robert Brody said he was the attorney for County Road Property LLC, who had just purchased the property two days ago. He said it was the intent of his client to comply with the Town and also to work with the Town. There is an appeal pending and Mr. Brody said it was his client's intent to work everything out with ARCOM prior to that appeal. He said he had recommended to his client that he withdraw the appeal. Mr. Brody said his client had hired the Lawrence Group and Gene Lawrence planned to work with ARCOM.

MOTION BY MS. DUEMLER TO POSTPONE THE CASE UNTIL AUGUST 21, 2008
SECONDED BY MS. VAN BUREN
MOTION PASSED UNANIMOUSLY

VII. Fine Consideration:

A. Case # 08-2432, Beachfront Vista Property, Nightingale Beach Club Association
Violation of Chapter 134, Section 134-1472 (3) of the Town of Palm Beach Code of Ordinances, no additional walls, fences, hedges or other structures or growth shall be erected or be grown eastwardly of Ocean Boulevard to a height greater than four (4) feet above the surface of the Ocean Boulevard.

(Ms. Duemler recused herself as part of a previously declared conflict and Mr. Hoffman advised Mr. Vanneck would be a voting member in this case)

Lead Code Enforcement Officer Walton said Nightingale Beach Club had previously been found in violation and was given time to obtain a permit. A permit was obtained but there were some conditions attached to it. There have been two inspections with the Florida Wildlife Commission and an agreement was reached to not require the vegetation to be trimmed until after turtle season. Since they have already been found in non-compliance, the Town recommends the time for compliance be extended to November 7, 2008 and if compliance is not achieved by that date, a fine of $250.00 a day be imposed.

Jack Maxey, 244 Nightingale Trail, presented some documents to the Board and advised he was president of the Nightingale Trail Beach Club Association. He said one of the documents was his application under duress for the permit. Mr. Maxey advised he had not been sworn in and was administered the oath of office by Recording Secretary Houston.

Mr. Maxey said he has had a long correspondence with the legal department of the Department of Environmental Protection and he believes on an emotional level, they do not believe the trees should come down but they told him they could not find any statutory way to force the Town not to enforce the permit. They told him it should be the jurisdiction of a court, not the DEP. Mr. Maxey said the Town was cutting down its own sea grapes in violation of the permitting process. Mr. Maxey said there were all kinds of burdens in this permit he needed to comply with, one of which was replacement of the whole plant if anything over 6 feet tall which was larger than 3 inches in diameter was cut down. He said he was supposed to provide a signature on the document putting himself at risk of a $10,000 a day fine if he did not comply with the requirements of the permit. Mr. Maxey said Jean Higgins, a biologist for the State Fish & Wildlife, recommended sea grapes should not be trimmed because they are the best source of protection against the lighting. Ms. Higgins made some suggestions such as changing light fixtures and extinguishing lights during turtle season and maintaining a substantial healthy vegetation light blocking buffer.

Mr. Maxey said an approximate 24 inch piece of aluminum is hanging from the light on Nightingale Trail and it seemed highly unusual that a shield of that nature would only be necessary on that light when the recommendations given by Fish & Wildlife are recommendations with broad reaching impact for the entire island. He noted that the street lights in Palm Beach do not go off during turtle nesting season. He said a field permit for trimming of the sea grapes at the Nightingale Beach Club Association was not recommended during the nesting season. He said the indifference to materials he had brought forth more than a year ago that had now been brought forth officially by the DEP were offensive to him and that is one of the reasons he had continued to “hammer” this. He said he believed the Board should recommend to the Town Council that they remove this section of the Code, given the current environmental regime, especially when one considers the public relations downside of fighting him on this issue and spending $2,000,000 to fight Lake Worth on the other side. Mr. Maxey said this was probably not a win-win situation and that NOAA had not even been brought into the fold yet.

Mr. Ochstein wanted to know if the Board was precluded from enforcing the ordinance now. Mr. Walton said it should not be enforced now, that in speaking with Mr. Wettstein from DEP and Ms. Higgins from FWC, an agreement had been reached to wait until the end of turtle season to require the trimming. The Town recommends granting the Nightingale Beach Club until November 7, 2008 to come into compliance. The permit is good until that date. In response to Mr. Hoffman’s question, Mr. Walton said the permit was issued on June 16, 2008. Mr. Maxey said he applied on March 19, 2008. Mr. Balletine inquired as to whether 7 days was sufficient for compliance after the end of turtle season and Mr. Walton said it was not a large area and he believed it was. Mr. Maxey said he did not believe it was sufficient, that it would be an economic hardship if he had to replace every tree that is over 3 inches in diameter in order to get it below 6 feet and he brought up other issues involved with the trimming. Mr. Balletine told Mr. Maxey he just wanted to know, without going into a lot of detail, whether he could comply in a 7 day period. Mr. Maxey said that before he could remove any native plant, he had to first remove every single non-native one from the property and he had some questions whether or not he could comply within that time period. He also said he had some real questions about whether the law, both at the State and the local level, had been equally applied within the Town. Mr. Maxey said he is in consultation with an attorney to find out what measures he can take. The Town did not apply for a permit to cut its own sea grapes and judging from the guidelines he has in his permit, the Town would be in violation of almost everyone of those guidelines. The DEP counsel’s office asked him to provide photographs of the Town’s illegal cutting back in February.

Mr. Vanneck said there should be more research as to what should and should not be cut. He believes the Town code may have gone too far.

Mr. Hoffman said the Board did not have the authority to modify the Code and could only enforce the Codes as they had been written.

MOTION BY MR. OCHSTEIN TO GRANT THE VIOLATOR UNTIL NOVEMBER 7, 2008 TO COME INTO COMPLIANCE AND IF COMPLIANCE IS NOT ACHIEVED BY THAT DATE, TO ASSESS A FINE IN THE AMOUNT OF $250.00 A DAY UNTIL COMPLIANCE IS ACHIEVED SECONDED BY MR. BALLENTINE

Mr. Vanneck asked for clarification on what the motion was and Mr. Walton advised the motion was that the sea grapes must be cut after turtle season, by November 7, 2008 and if they were not cut by that date, a $250.00 a day fine would commence on November 8, 2008 and continue until compliance was achieved.

Mr. Fried asked who the fine would apply to and Mr. Walton said it would be to the Nightingale Trail Beach Club Association. Mr. Fried asked if this was a legally constituted body and Mr. Maxey said it was an informal body, that on the deeds, everyone owns this piece of property in common. There was some additional discussion on the ordinance. Ms. Van Buren asked if every single property owner on the street was a member of the association and Mr. Maxey said every property owner on Nightingale Trail was and there were one or two houses on North Ocean and North Lake as well. Mr. Maxey said there were 23 separate memberships. Ms. Van Buren asked about the finances and Mr. Maxey said there were annual dues of $75.00 a year and a common bank account of $3500 or $3600. Mr. Maxey said that if a fine was incurred, that is probably where the money would come from but he did not believe, because of his fiduciary responsibility to the group, he could fight the decision with any of those monies. Mr. Ochstein asked if he was an elected officer and Mr. Maxey said he was president and that he keeps the books and makes sure the place is in good condition.

MOTION BY MR. OCHSTEIN TO GRANT THE VIOLATOR UNTIL NOVEMBER 7, 2008 TO COME INTO COMPLIANCE AND IF COMPLIANCE IS NOT ACHIEVED BY THAT DATE, TO ASSESS A FINE IN THE AMOUNT OF $250.00 A DAY UNTIL COMPLIANCE IS ACHIEVED
SECONDED BY MR. BALLENTINE
MOTION OPPOSED

ROLL CALL VOTE:

MR. OCHSTEIN	**YES**
MR. BALLENTINE	**YES**
MR. FRIED	**YES**
MS. GREENBERG	**YES**
MS. VAN BUREN	**YES**
MR. VANNECK	**NO**
MR. HOFFMAN	**YES**
MOTION PASSES	**6-1**

Mr. Fried advised Mr. Maxey that the Code Enforcement Board's position was to enforce the Code and said that he had always found the Town Council members to be very receptive, individually and as a group. Mr. Fried said it was not beyond the Town Council's power and authority, if persuaded, to look into an ordinance and suggested Mr. Maxey address it with them.

B. Case # 08-2508, 227 Brazilian Ave., 2F, Hillen J. Smith

Violation of Chapter 18, Section 18-241 of the Town of Palm Beach Code of Ordinances, building permits required to construct, install, repair or alter any building or building system

Lead Code Enforcement Officer said Mr. Smith was found in violation, assessed $150.00 in administrative costs and given until July 16, 2008 to come into compliance. Compliance has not been achieved so this is the time a fine would be assessed. Mr. Walton said the contractor was present to speak.

Steve Pappanelli said he was hired by Mr. Smith after Mr. Smith had been cited and he was 90% complete with the job. He was just waiting on his final inspection and he should have it by next week but the building is closed to all construction inspections for two (2) weeks. Mr. Pappanelli said he was present on Mr. Smith's behalf to request a three (3) week extension. Mr. Walton said the Town did not oppose the extension of time. Mr. Walton said the three weeks was necessary because the building would not let inspections be done while their maintenance man was on vacation. Mr. Walton said if compliance was not achieved by August 7, 2008 then he would ask for a $250.00 a day fine to commence on August 8, 2008.

Ms. Greenberg asked some questions about the type of permits and remarked that it is unfortunate in multi-family dwellings that this type of situation would exist to begin with because electrical and plumbing can have catastrophic effects on other owners. She said it is unfortunate the people do not do the right thing until they get caught. Mr. Pappanelli said he was not the contractor working without permits.

MOTION BY MR. OCHSTEIN TO GRANT AN EXTENSION OF TIME UNTIL AUGUST 8, 2008 TO COME INTO COMPLIANCE AND TO ASSESS A FINE OF $250.00, RETROACTIVE TO JULY 17, 2008 IF COMPLIANCE WAS NOT ACHIEVED
SECONDED BY MS. GREENBERG

During discussion on the motion, Ms. Duemler stated she believed the retroactive fine was a little harsh. Mr. Ballentine said he agreed and asked the reason for the retroactive fine. Mr. Ochstein said there are so many people who do work without a permit and they know they need a permit. That is a very dangerous thing in a multi-family dwelling and it should be egregious.

MOTION BY MR. OCHSTEIN TO GRANT AN EXTENSION OF TIME UNTIL AUGUST 8, 2008 TO COME INTO COMPLIANCE AND TO

ASSESS A FINE OF $250.00, RETROACTIVE TO JULY 17, 2008 IF COMPLIANCE WAS NOT ACHIEVED
SECONDED BY MS. GREENBERG
MOTION PASSED UNANIMOUSLY

VIII. Fine Reduction:

A. Case # 08-2301, 167 E. Inlet Drive, The Landfall Group,
Violation of Chapter 18, Section 18-242, Subsection 104.5.1.6, medium projects, all new or remodel construction projects 4000 sq. ft, to 8,999 sq. ft. under roof be allowed 22 months

Lead Code Enforcement Officer Walton said in October, 2007, Ajax Equity LLC was found in violation of going over the construction time limits. On November 15, 2008 they still were not in compliance and a daily fine of $250.00 started running. The final inspection was obtained in March, 2008. The fine ran for 137 days prior to compliance being achieved and the accumulated fine due is $34,250.00 and the $150.00 hearing costs have not been paid.

Frank Lynch advised he was the attorney for both The Landfall Group and Ajax. He said when they appeared before the Board in October, Lazslo Wagner, the principal of The Landfall Group, who has built homes throughout the Town of Palm Beach for 26 years acknowledged he was unaware of this particular code provision. Had he been, they would have applied for an extension of time to complete the construction. At the hearing, Mr. Koeppel made a motion to allow them an additional sixty (60) days to complete the construction, find them in non-compliance and assess the $150 costs. After a significant amount of discussion, that motion went to a vote and failed 4-3. A second motion was made and Ms. Duemler thought the $250.00 fee was significant and believed the fine should be $125.00 a day. Mr. Lynch gave Mr. Walton a copy of that transcript to put in the record. As part of their request, they are asking the Board to consider what Ms. Duemler suggested at the meeting. At the same time, Mr. Lynch said he would like them to consider that The Landfall Group is a good corporate citizen and made a legitimate mistake. As a result, a fine was incurred and they are willing to accept some level of fine, some level of responsibility for what they did. The construction was continually on going, there were no delays other than the construction process itself. This was not someone's house, it was a speculative venture. There had been some concerns with the shell contractor and the finish items themselves were significant enough that there were substantial delays. At that same hearing, Code Enforcement Officer Gerry said it was the position of Code Enforcement to get more assertive at the suggestion of Town Council and that these projects were to be more aggressively pursued. Under the new ordinance, for a house of approximately 5,000 sq. feet, they would be entitled to 24 months. This would have brought them to November 2007 and they would have gotten additional time for Hurricane Wilma which would have brought them to December. If they were under the new Code, they would not be before the Board today and may not have a fine at all. He realizes a mistake was made, he realizes something has to be paid but he thinks $35,000 is a significant fine. The Board has gotten their attention and they would ask for a significant reduction in the fine.

Mr. Fried asked how long it took to get the final inspection after the 22 months had run. Mr. Walton said they had been given 23 months due to the hurricanes and they were 5 months and 9 days beyond that. Mr. Ballentine asked how far out they would be under the new rules. Mr. Walton said they would be given 24 months which with the hurricane would be 25 months. Mr. Lynch said that at the end of that 24 month period, if they had not sought an extension of time within the required time period, no earlier than 6 months and no later than 45 days, before the expiration of that 24 months, their project would have been shut down. Mr. Wagner's lack of knowledge of this particular situation would have become irrelevant because they would have been red tagged on the next day after the 24 month period. Mr. Lynch said Mr. Wagner did not know because he has been a good corporate citizen and had never been before the Board except on one occasion which was beyond his control; it was a maintenance item on the Glazer house. Mr. Walton said that situation was not due to Mr. Wagner's fault, that he was just representing the owner.

Mr. Ballentine asked how Mr. Wagner did not know the Code requirement if he had built so many homes in the area and said he had difficulty with the ignorance of that.

Mr. Fried said he agreed with Mr. Ballentine and found it hard to believe that Mr. Wagner did not know the time limits. He said some reduction should be considered but he was not sure on what basis.

Mr. Ochstein remarked that the fine was around $35,000 and the house was on the market for $10.6 million dollars so he did not see the hardship. Mr. Lynch said he did not know the price but he would accept Mr. Ochstein's statement on that. Mr. Lynch said the hardship was in the imposition of the fine itself, there were mistakes made and he believed that Council would have given them a significant extension of time if Mr. Wagner had been aware of the situation and filed the proper notice with Town Council.

Mr. Lynch said if some sort of arrangement could be reached today, his client would be in a position to pay within the next two weeks. Mr. Hoffman said he was concerned because he believed that when the case was originally heard, they had the option of fining $250.00 a day and they gave them a fine reduction at the time they initiated the fine of $125.00 a day. Mr. Walton corrected Mr. Hoffman, advising there was a motion for a fine of $125.00 a day which failed and the fine that was in effect was $250.00 a day. Mr. Lynch said he believed the record reflects something different than that. Mr. Walton said his records reflect $250.00

a day but he would review it. Mr. Walton reviewed the transcript and noted that it showed $125.00 a day but the Board order specified $250.00 a day and he would have to do further research.
Mr. Fried advised he could make a motion to postpone the matter to the next meeting and have Mr. Walton bring back the correct information. There was additional discussion about the amount of the fine and Mr. Lynch said he was seeking a reduction of the $17,125.00 which would be the amount of the fine if it was $125.00 a day. Mr. Hoffman said he would find that hard to accept. Mr. Hoffman read from the minutes that a motion was made by Mr. Fried that the defendant was found in non-compliance, ordered to pay an administrative fee in the amount of $150.00, obtain a final building inspection by October 25, 2008 and a fine of $125.00 to commence on October 26, 2007. He said that motion passed 4-3. Mr. Walton said he could not dispute that but he would have to do some research. Mr. Hoffman said he would not be in favor of reducing the $17, 125.00 any further.

Mr. Ochstein said he was hesitant to do anything until they know what the number is. Mr. Walton suggesting postponing the case until next month.

MOTION BY MR. OCHSTEIN TO POSTPONE THE FINE REDUCTION HEARING UNTIL AUGUST 21, 2008
SECONDED BY MR. FRIED
MOTION OPPOSED

ROLL CALL VOTE:

MR. OCHSTEIN	**YES**
MR. FRIED	**YES**
MS. DUEMLER	**YES**
MS. GREENBERG	**NO**
MS. VAN BUREN	**NO**
MR. BALLENTINE	**YES**
MR. HOFFMAN	**NO**
MOTION PASSES	**4-3**

B. Case # 08-2302, 9 Via Vizcaya, Macari Building & Design, Casa Picchio, LLC
Violation of Chapter 18, Section 18-242, Subsection 104.5.1.6, medium projects, all new or remodel construction projects 4000 sq. ft, to 8,999 sq. ft. under roof be allowed 22 months

Lead Code Enforcement said the property was found in non-compliance and they requested a fine reduction hearing. The owner of the property was called out of town and they requested a postponement until the August hearing.

MOTION BY MS. GREENBERG TO POSTPONE THE FINE REDUCTION HEARING UNTIL AUGUST 21, 2008
SECONDED BY MS. VAN BUREN
MOTION PASSED UNANIMOUSLY

IX. Comments:

Ms. Greenberg said that the presentation using the "slides" made it too dark in the room. She wanted to know if there was anything they could do as a Board in making a suggestion to the Council about an ordinance that could address people not pulling permits because of the safety issues in terms of multi-family dwellings. Capt. Blouin said there was a provision in place. If work is done without a permit, there is a penalty involved. There was an ordinance drafted last year that requires them to pay four times the permit fee.

Mr. Fried asked Mr. Randolph if he had spoken to Mr. Elwell about the foreclosure action being brought to the Board's area of responsibility as opposed to the Town Council. Mr. Randolph said he had but did not have an answer yet and would try to get one. Mr. Fried asked Ms. Houston about progress on the fines and she said the Town was now inputting fines into the computer system and if someone had outstanding fines they could not get any permits. People are contacting Code Enforcement because they cannot get permits and are either paying or asking to come back to the Board for a fine reduction.

Capt. Blouin advised that with regard to any foreclosure action, the police department is scrutinizing each and every one of them as some of these cases we have liens on were pre-existing prior to coming to the police department. We do not want to bring a case to the board that can be handled in a different manner.

Mr. Walton remarked that it was a good thing that there are a number of working without permit cases being brought to the Board, that it means Staff is doing their job.

X. Adjournment:

The meeting was adjourned without benefit of a motion.

TOWN OF PALM BEACH

Information for the Water Committee Meeting on January 29, 2009

To: Water Committee:
David A. Rosow, Chair
Denis P. Coleman, Member

Via: Peter B. Elwell, Town Manager

From: Sarah E. Hannah, Assistant Town Manager

Re: Information Regarding Water Supply

Date: January 23, 2009

The following documents are attached for your review in preparation for the Water Committee meeting on January 29 at 3 p.m.:

1. Agenda

2. PowerPoint presentation from the City of West Palm Beach regarding the four options for the Town's water supply and relationship with the City.

3. Cost estimates and other information regarding private wells.

4. Follow-up on prior water committee information requests:

    a. Information from the City regarding per capita usage in Palm Beach.
    b. Information from the City regarding a comparison of the City's water quality with New York City's water quality
    c. Statistical analysis of the top 100 water consumers on the island.
    d. Average daily effluent flow for the cities that use the East Central Regional Water Reclamation Facility (ECRWR).
    e. Executive summary of the results from the Town's testing of the City's potable water (the rest of the report is available in the Town Manager's Office).

cc: Mayor and Town Council
Eduardo Balbis, P.E., City of West Palm Beach
Jane Struder, Finance Director
H. Paul Brazil, Director of Public Works
John Page, Director of Planning, Zoning, and Building
James Bowser, Town Engineer

TOWN OF PALM BEACH
Town Manager's Office

**TENTATIVE-
SUBJECT TO
REVISION**

WATER COMMITTEE MEETING

AGENDA

JANUARY 29, 2009

3:00 P.M.

WELCOME!

The progress of this meeting may be monitored by visiting the Town's web site (www.townofpalmbeach.com) and selecting "Live Agenda" or "Council Audio". If you have questions relative to these two features, please contact the Office of Information Systems (561) 227-6315.

I. CALL TO ORDER AND ROLL CALL

II. PLEDGE OF ALLEGIANCE

III. APPROVAL OF AGENDA

IV. PRESENTATION BY CITY OF WEST PALM BEACH OF FOUR (4) WATER SUPPLY OPTIONS

V. DISCUSSION OF INDIVIDUAL PRIVATE WELLS FOR IRRIGATION

VI. FOLLOW-UP ON PRIOR WATER COMMITTEE INFORMATION REQUESTS

VII. ANY OTHER MATTERS

VIII. ADJOURNMENT

Note: Disabled persons who need an accommodation in order to participate in the Town Council Meeting are requested to contact the Town Manager's Office at 838-5410 or through the Florida Relay Service by dialing 1-800-955-8770 for voice callers or 1-800-955-8771 for TDD callers, at least two (2) working days before this meeting.

TOWN OF PALM BEACH
WATER COMMITTEE

CITY OF WEST PALM BEACH FLORIDA

THE TOWN OF SOUTH PALM BEACH FLORIDA

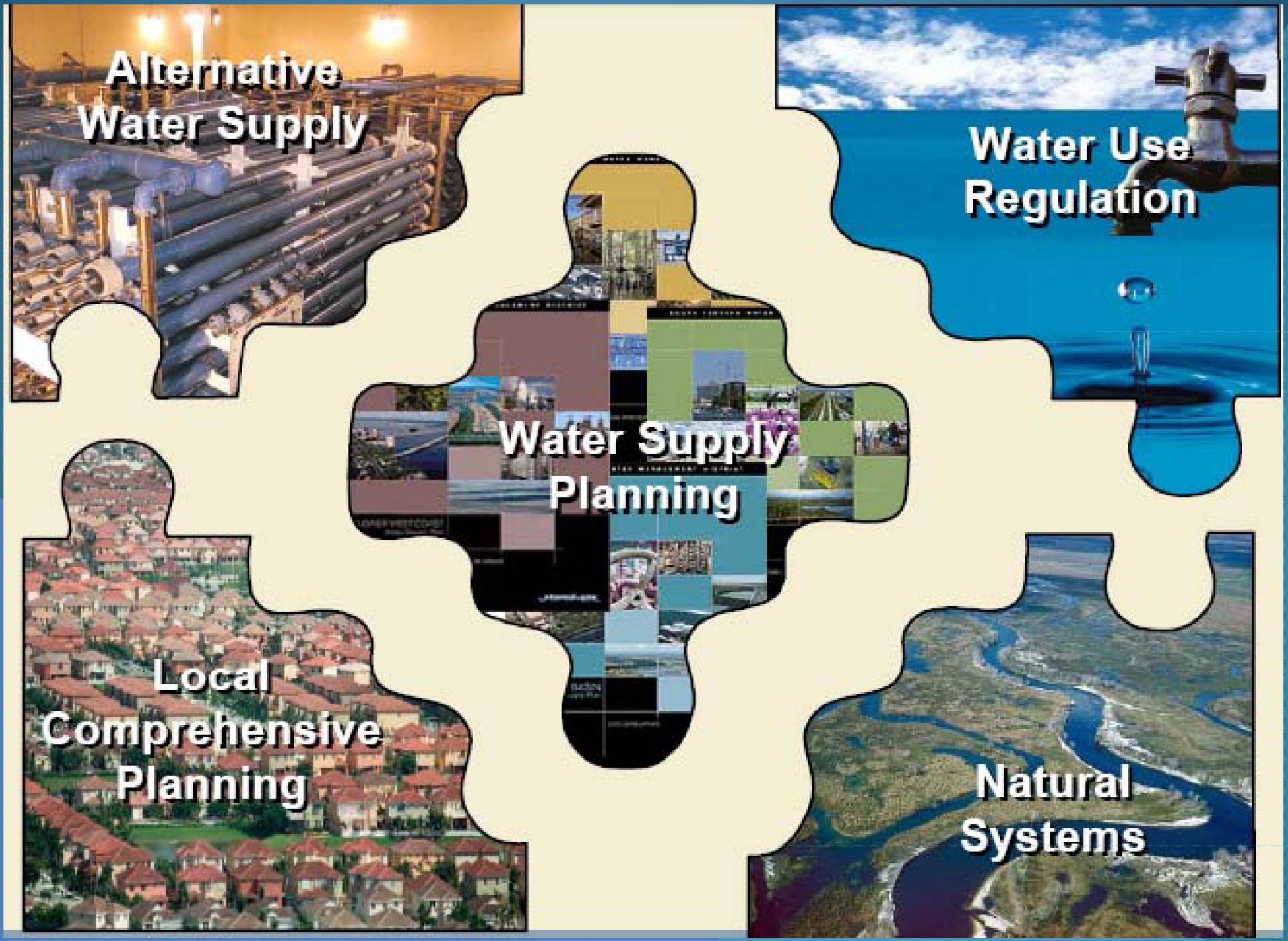
Discussion of Future Plant Options

January 2009

PRESENTATION AGENDA

- Competing Regulations
- Desalination Water Plant
- Floridan Water Plant
- Town Remains As Equal Customer
- Town Becomes Bulk Customer
- Next Steps

COMPETING REGULATIONS


Alternative Water Supply
Water Use Regulation
Water Supply Planning
Local Comprehensive Planning
Natural Systems

DRAFT YEAR ROUND IRRIGATION RULE

- Latest draft SFWMD language dated October 31, 2008.
- Public Hearing Scheduled for January 15th.

40E-24.201 Year-Round Landscape Irrigation Conservation Measures.

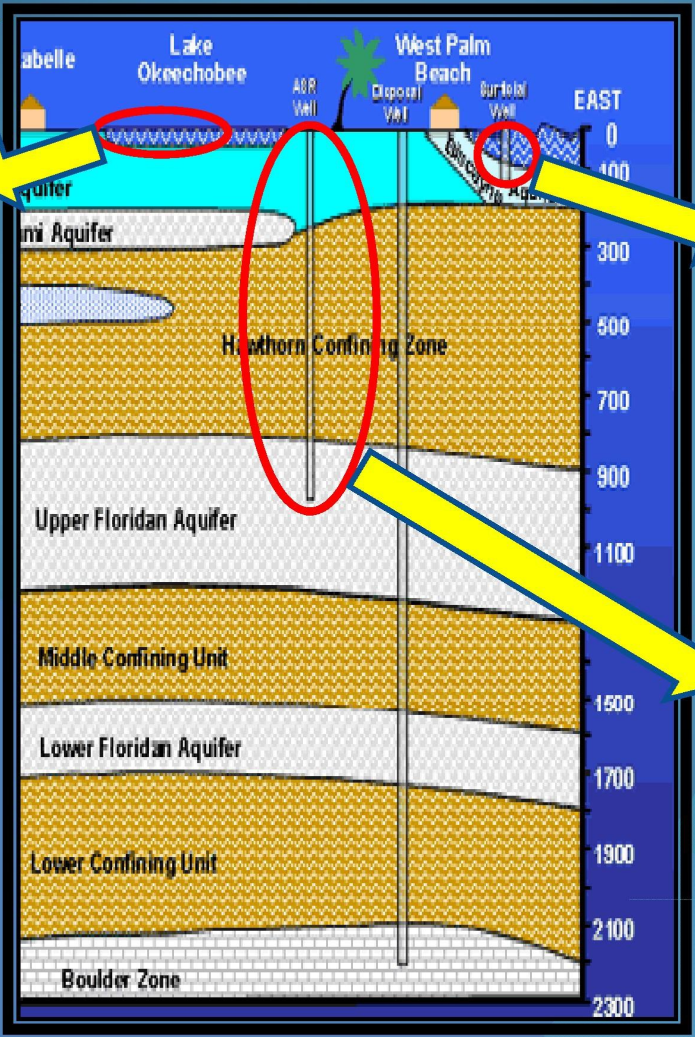
(1) The year-round landscape irrigation conservation measures contained in this chapter are applicable to all users as defined in subsection 40E-24.101(16)~~(10)~~, F.A.C., including permitted and exempt users under Chapter 40E-2, F.A.C., unless indicated otherwise herein. These conservation measures apply to all water sources, except that landscape irrigation accomplished using reclaimed water and/or supplemented reclaimed water is subject to only paragraphs (5)(a), (l) and (5)(b), (l) of this section. In addition to the requirements of this section, all permitted users under Chapters 40E-2 and 40E-20, F.A.C., are required to maintain compliance with all CUP conditions and

(14) "Supplemented reclaimed water" and "blended reclaimed water" means reclaimed water which has been commingled with other sources of water, such as potable water, groundwater, surface water, and water treatment process by-product by a public or private utility.

Unless the Town uses reclaimed water for irrigation it may be subject to the Year Round Irrigation Rule – even if Floridan or Seawater is used.

SUPPLY SOURCES

SURFACE WATER SOURCES


abelle
Lake Okeechobee
ASR Well
Disposal Well
West Palm Beach
Surficial Well
EAST
0
100
300
500
700
900
1100
1500
1700
1900
2100
2300
quifer
mi Aquifer
Hawthorn Confining Zone
Upper Floridan Aquifer
Middle Confining Unit
Lower Floridan Aquifer
Lower Confining Unit
Boulder Zone

Clear Lake

- Existing Infrastructure
- Variable Quality
- Watering Restrictions
- Permitted

Atlantic Ocean

- Unlimited Supply
- Complex Treatment
- Consistent WQ
- Greenhouse Gases
- Highest Cost

GROUNDWATER SOURCES

Surficial Aquifer

- 100 – 150 feet deep
- Consistent WQ
- Watering Restrictions
- Saline Intrusion
- Limited Allocation
- Availability Unknown
- 30 – 50 Sites Needed

Floridan Aquifer

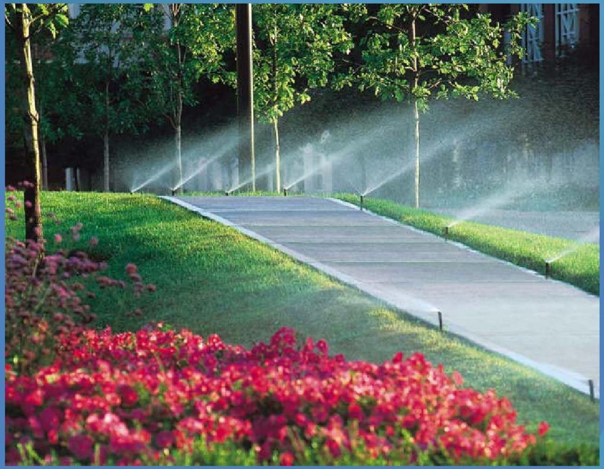
- 1,000-1,200 ft deep
- Consistent WQ
- Long-Term Degradation
- Very Costly
- No Watering Restrictions
- Limited Allocation
- 12 – 20 Sites Needed

DESALINATION PLANT OPTION

City Dedicates Seawater Plant for Town

- Town remains a customer of the City of West Palm Beach
- Additional capital and operational costs to Town of Palm Beach
- Desalination plant located on City property

secure
reliable
sustainable



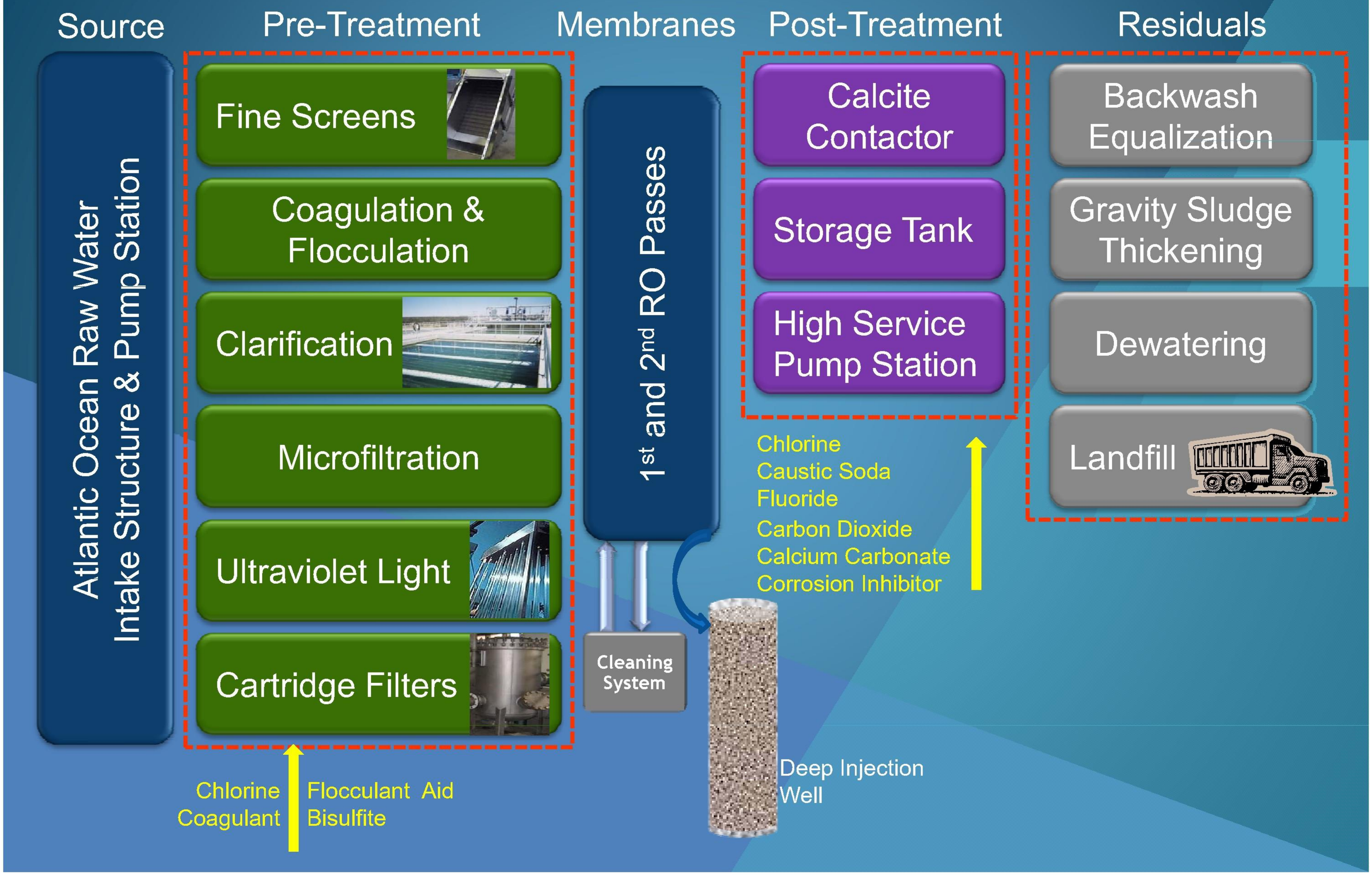
WHY LOOK TO THE OCEAN?

- Sustainable drought-proof source of water
- Concern for availability of fresh surface water and groundwater resources = ***regulatory pressure***
- Decreasing costs due to technology improvements
- Comparable costs to indirect potable water reuse projects

TAMPA BAY DESALINATION FACILITY

- 25 mgd plant
- Co-located with power plant
- 8.5-acres for WTP
- Provides 10% water demand for region
- Screening, filtration, RO membranes, chemical systems
- AWS funding provided

DESALINATION PROCESS FLOW DIAGRAM



Source

Atlantic Ocean Raw Water
Intake Structure & Pump Station

Pre-Treatment

Fine Screens

Coagulation & Flocculation

Clarification

Microfiltration

Ultraviolet Light

Cartridge Filters

Chlorine
Coagulant

Flocculant Aid
Bisulfite

Membranes

1st and 2nd RO Passes

Cleaning System

Deep Injection Well

Post-Treatment

Calcite Contactor

Storage Tank

High Service Pump Station

Chlorine
Caustic Soda
Fluoride
Carbon Dioxide
Calcium Carbonate
Corrosion Inhibitor

Residuals

Backwash Equalization

Gravity Sludge Thickening

Dewatering

Landfill

PRE-TREATMENT IS KEY TO SUCCESS

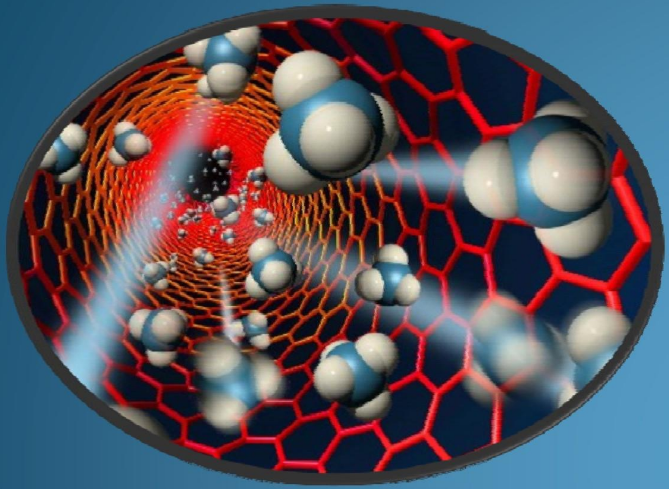
- Protect the Membranes
- Screens remove shells, creatures, wood and debris greater than ¼ inch
- Heavier solids settled out via flocculation and clarification
- Smaller solids filtered via microfiltration membranes
- Ultraviolet light controls biological activity and fouling
- Control scale formation by adjusting pH and using antiscalants

Fine screens

UV units

Clarification Basin

SPECIALIZED MEMBRANES FOR TREATMENT

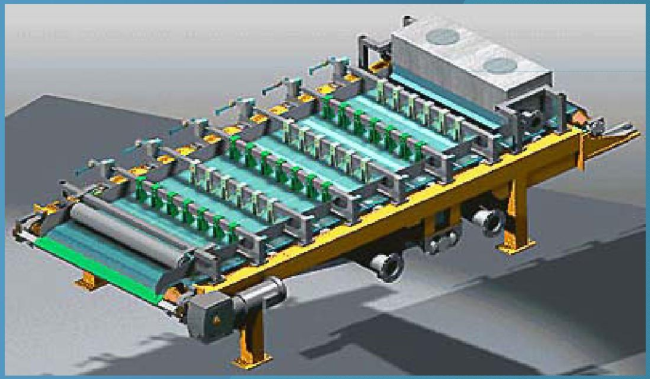


- RO membranes allow water particles (dissolved ions) to pass through tiny screens, while blocking salts
- Highly specialized technology
- Large amounts of power required to “push” water through the membranes via pressure
- Pre-treatment important to protect costly membranes

SOLIDS HANDLING REQUIRED

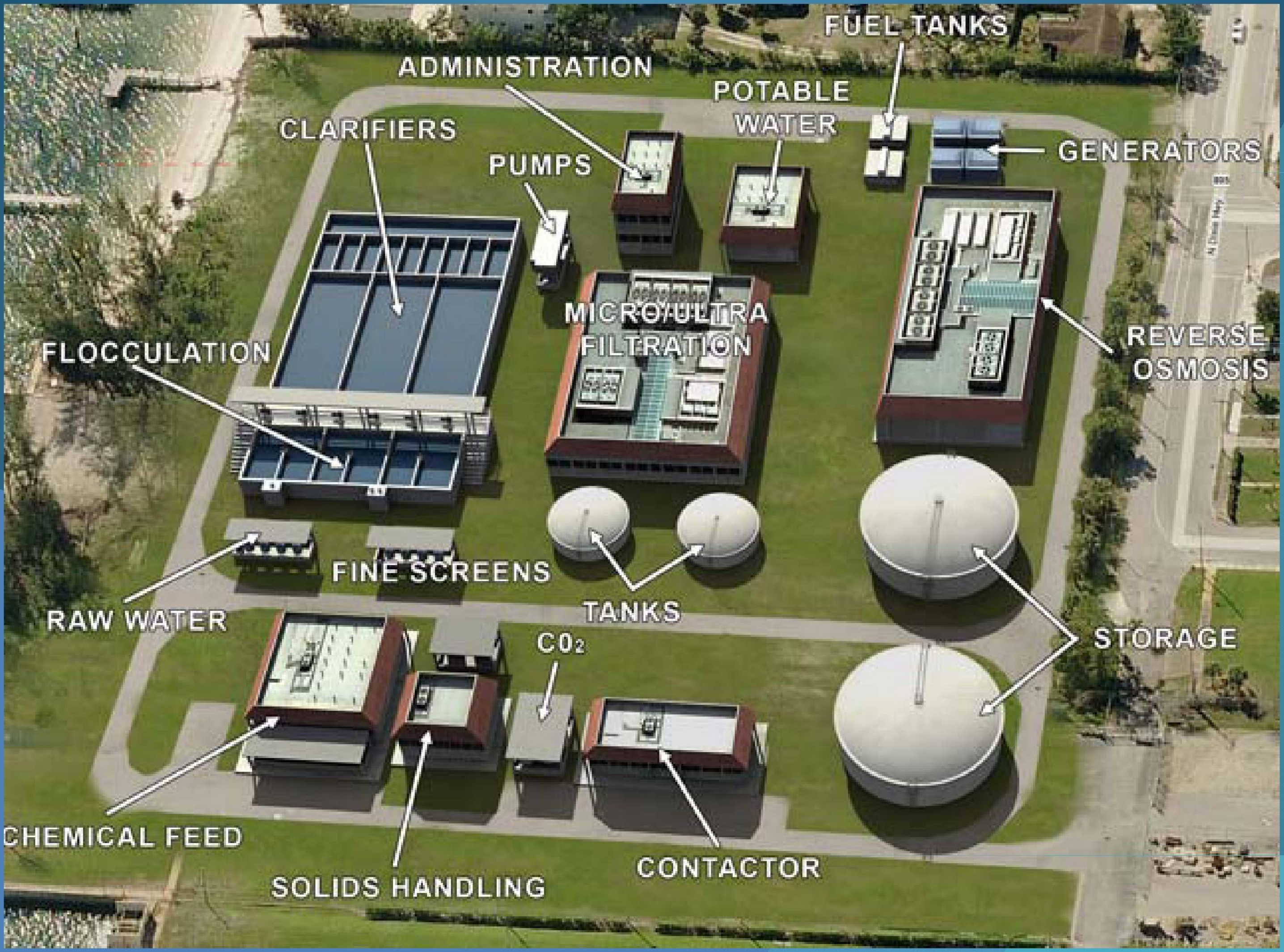
Desalination produces “waste” streams that require materials to be disposed via landfill.

- Debris removed by screens (shells, wood, etc) must be landfilled
- Clarification process & microfiltration backwash solids are thickened, dewatered, and sent to the landfill for disposal



Transportation of solids increase facility operations cost and result with a larger carbon footprint.

DESALINATION PLANT LAYOUT


FUEL TANKS
ADMINISTRATION
POTABLE WATER
CLARIFIERS
GENERATORS
PUMPS
MICRO/ULTRA FILTRATION
FLOCCULATION
REVERSE OSMOSIS
FINE SCREENS
TANKS
RAW WATER
STORAGE
C0₂
CHEMICAL FEED
CONTACTOR
SOLIDS HANDLING

DESALINATION PLANT ISSUES

- 25 mgd facility required to produce 10 mgd potable water.
- Approximately 10 acres required for infrastructure.
- Complex treatment processes.
- Brine by-product waste disposal via deep injection well (ocean outfalls no longer permitted for WTPs).
- Dewatered sludge must be disposed at landfill.
- Highly energy intensive to operate.
- Not necessarily exempt from proposed year-round water restrictions drafted by SFWMD

DESALINATION PLANT COSTS

Cost Estimate for 10 mgd Desalination Plant		
Site Work	$	3,000,000
Raw Water Intake, Pumping, Piping, and Fine Screens	$	12,000,000
Coagulation, Flocculation, Clarification	$	3,900,000
Pretreatment Transfer Pumping	$	700,000
Microfiltration	$	22,000,000
Ultraviolet Light	$	4,100,000
Chemical Treatment	$	1,600,000
Reverse Osmosis Membrane System	$	48,600,000
Post Treatment Chemical Systems	$	2,300,000
Ground Storage Tanks	$	3,900,000
High Service Pumping	$	2,100,000
Residuals Handling	$	10,300,000
Administration & Laboratory Building	$	1,900,000
Brine Disposal Injection Well	$	6,000,000
Dedicated Water Transmission Piping	$	6,000,000
Conceptual Cost	**$**	**128,400,000**
General Requirements (2%)	$	2,568,000
Construction Mark-up (3%)	$	3,852,000
Mobilization (2%)	$	2,568,000
Contingency (10%)	$	12,840,000
Engineering and Other Non-Construction Costs (8%)	$	10,272,000
TOTAL CONCEPTUAL COST	**$**	**160,500,000**

Assumes plant on City property & no additional cost for land.

FLORIDAN AQUIFER WATER PLANT OPTION

City Dedicates Floridan Plant for Town of Palm Beach

- Town remains a customer of the City of West Palm Beach
- Additional capital and operational costs to Town of Palm Beach
- Low Pressure Reverse Osmosis plant located on City property

water

secure
reliable
sustainable

WHY LOOK TO THE FLORIDAN AQUIFER?

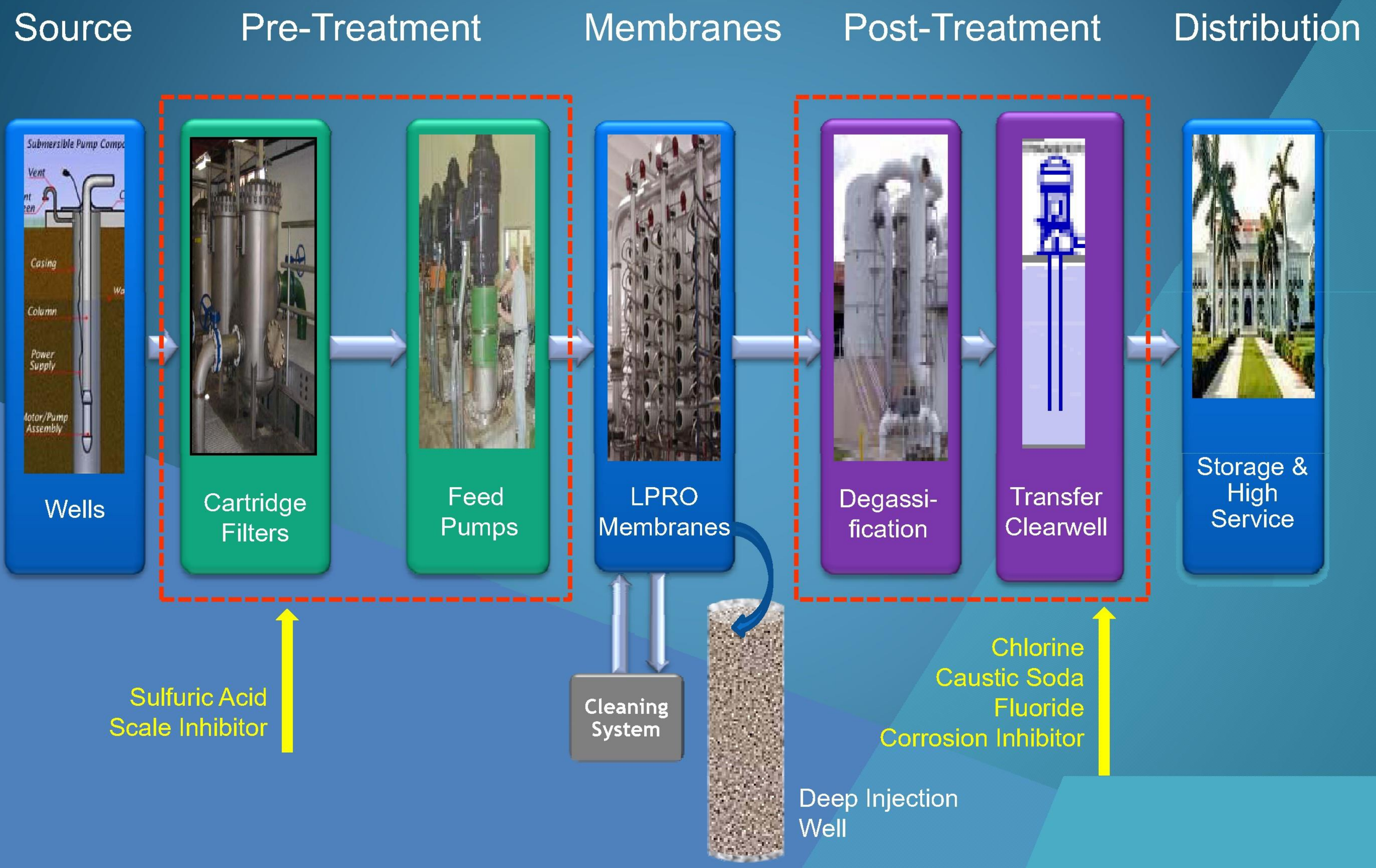
- Reliable and drought-proof source located approximately 1,200 feet below ground surface
- Relatively stable water quality seasonally, but geographically variable
- Reduces demands on water for the Everglades
- Significantly less energy intensive than desalination processes
- Landfill transportation and disposal costs not applicable

LOCAL UTILITIES ARE USING FLORIDAN AQUIFER

- Palm Beach County
- Jupiter
- Deerfield Beach
- Broward County
- Highland Beach
- Fort Myers
- Palm Coast
- Marion County
- St. John’s County
- Hollywood
- Miramar
- Florida Keys

Palm Beach County’s 10 mgd Lake Region WTP

LOW PRESSURE RO PROCESS FLOW DIAGRAM


Submersible Pump Comp
Vent
Casing
Column
Power Supply
Motor/Pump Assembly

Source

Pre-Treatment

Membranes

Post-Treatment

Distribution

Wells

Cartridge Filters

Feed Pumps

LPRO Membranes

Degassi-fication

Transfer Clearwell

Storage & High Service

Sulfuric Acid
Scale Inhibitor

Cleaning System

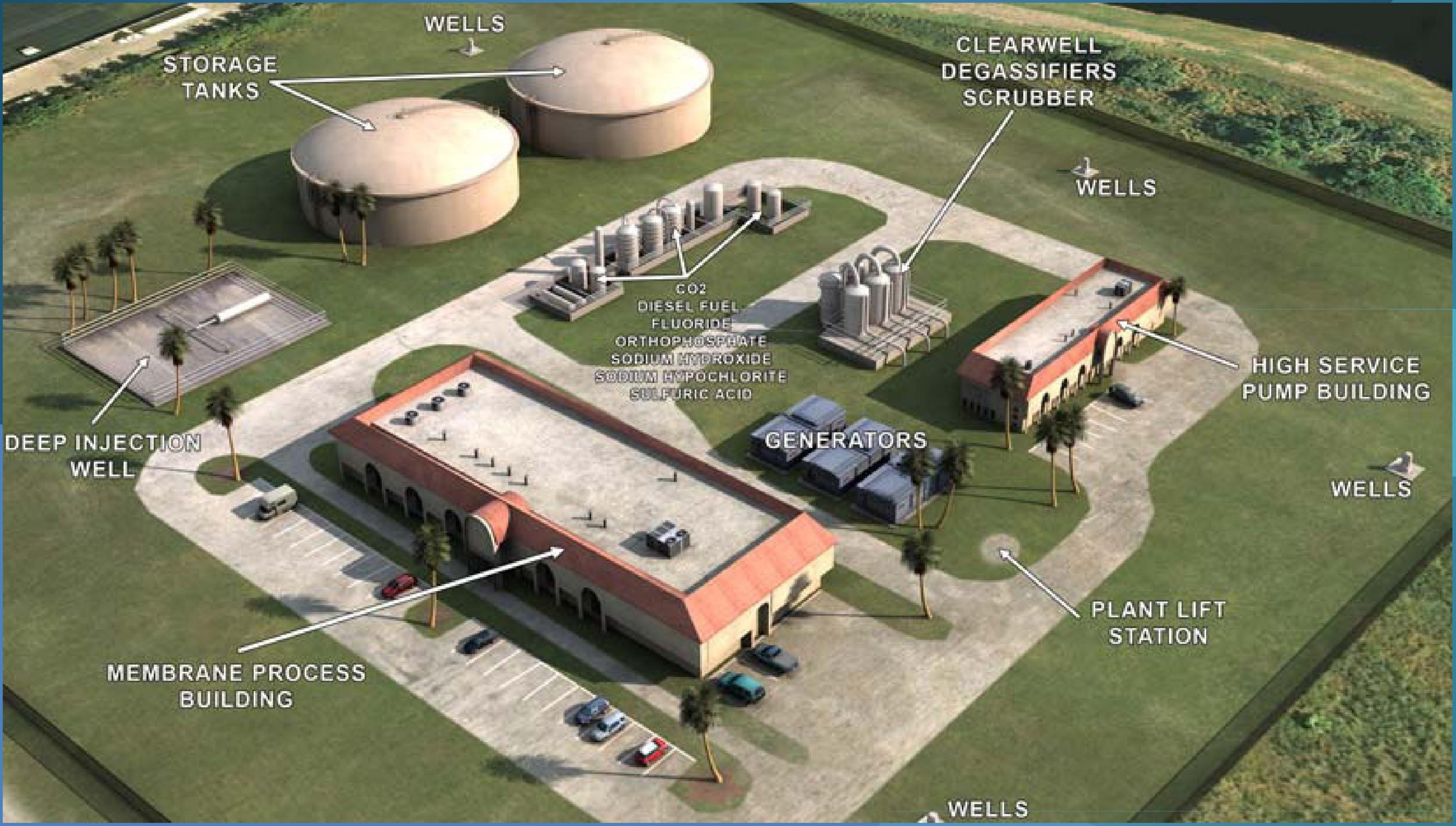
Deep Injection Well

Chlorine
Caustic Soda
Fluoride
Corrosion Inhibitor

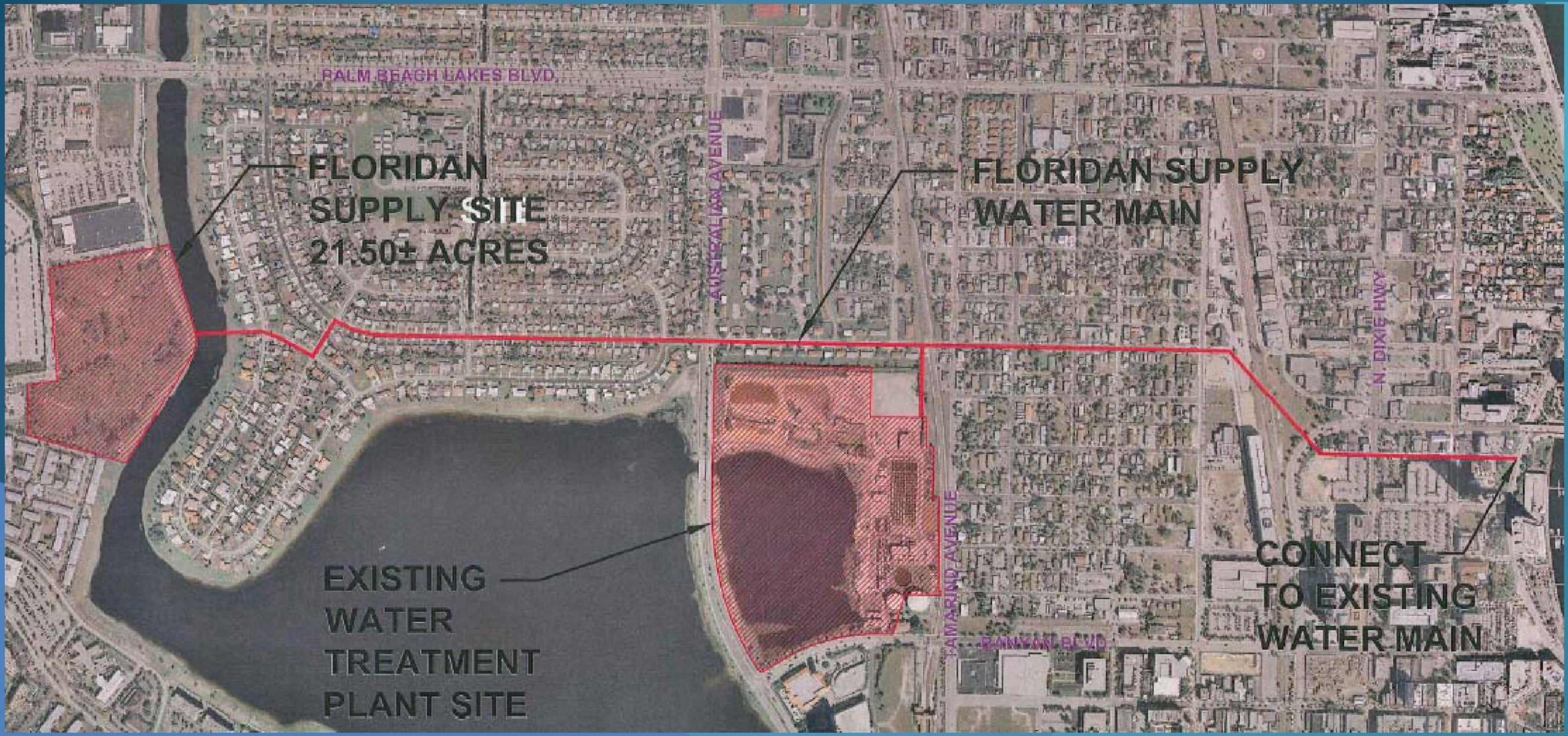
TREATMENT PROCESSES

- **SOURCE** - wells can be located near the plant. No existing users to cause interference (today).
- **PRE-TREATMENT**- disposable 5 micron cartridge filters, pH adjustment, & scale inhibitor.
- **MEMBRANES** – Low Pressure Reverse Osmosis elements require less power to push water thru screens.
- **POST-TREATMENT** – hydrogen sulfide removal with odor control, disinfection, pH adjustment, blending.
- **DISTRIBUTION** – connect to existing water main network without subaqueous crossings.

FLORIDAN PLANT LAYOUT


WELLS
STORAGE TANKS
CLEARWELL DEGASSIFIERS SCRUBBER
WELLS
CO2
DIESEL FUEL
FLUORIDE
ORTHOPHOSPHATE
SODIUM HYDROXIDE
SODIUM HYPOCHLORITE
SULFURIC ACID
HIGH SERVICE PUMP BUILDING
DEEP INJECTION WELL
GENERATORS
WELLS
PLANT LIFT STATION
MEMBRANE PROCESS BUILDING
WELLS

LOCATION


PALM BEACH LAKES BLVD
FLORIDAN SUPPLY SITE 21.50± ACRES
AUSTRALIAN AVENUE
FLORIDAN SUPPLY WATER MAIN
N. DIXIE HWY
EXISTING WATER TREATMENT PLANT SITE
TAMARIND AVENUE
BANYAN BLVD
CONNECT TO EXISTING WATER MAIN

The Floridan Aquifer wells are not restricted with respect to specific location in that no other production wells exists today near the City's WTP.

FLORIDAN AQUIFER PLANT ISSUES

- Floridan Aquifers can be used for both Aquifer Storage and Recovery and source water
- Potential increased energy costs associated with lifting water and impacts to adjacent users
- Potential for decline in water quality over time
  - Some pumping wells become saltier (up-coning of more saline water from below or laterally along coast)
  - Membrane design and periodic replacement
  - Blending with Surficial Aquifer water
- Estimated 125% of raw water to meet treated water demands
- Concentrate disposal via deep injection well

FLORIDAN AQUIFER PLANT COSTS

Cost Estimate for 10 mgd Floridan Plant		
Site Work & Site Electrical	$	3,000,000
Raw Water Wells & Piping	$	13,500,000
Pretreatment System	$	5,000,000
Membrane Building w/LPRO system	$	19,000,000
Chemical Feed Systems	$	2,000,000
Yard Piping	$	1,500,000
Clearwell	$	1,200,000
Transfer Pump Station	$	1,000,000
High Service Pump Station	$	2,100,000
Ground Storage Tanks	$	3,900,000
Brine Disposal Injection Well	$	6,000,000
Dedicated Water Transmission Piping	$	6,000,000
Conceptual Cost	**$**	**64,200,000**
General Requirements (2%)	$	1,284,000
Construction Mark-up (3%)	$	1,926,000
Mobilization (2%)	$	1,284,000
Contingency (10%)	$	6,420,000
Engineering and Other Non-Construction Costs (8%)	$	5,136,000
TOTAL CONCEPTUAL COST	**$**	**80,250,000**

Assumes no additional cost for land.

TOWN REMAINS AS EQUAL CUSTOMER

- Town subject to same water restrictions imposed on water supply for the entire service area

  A portion of the City's water supply IS supplemented with reclaimed water

- Town subject to same rates and debt service as other customers.
- Town's demand met with City's plant

  Pilot testing membrane treatment of surface water now

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reliable
sustainable

water

TOWN BECOMES A BULK CUSTOMER

- Town sets its own rate structure
- New Bulk Service Interlocal Agreement Required
- Town to become a retail utility service provider
- Study on-going by City's rate consultant regarding options for setting a bulk user rate

FINANCE
CUSTOMER SERVICE
OPERATIONS

The City evaluated finished water demand data for all Town of Palm Beach customers.

SUMMARY

Option	Capital Costs	Retail Costs	Bulk Costs
Desalination Plant	$160,500,000	TBD(+)	N/A
Dedicated Floridan Plant	$80,250,000	TBD(+)	N/A
Bulk Customer	N/A	N/A(+)	TBD
Remain as Equal	N/A	Current Rates	N/A

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NEXT STEPS

- SFWMD Rulemaking Outcome
- Determine City's Future Water System – Long-Term Improvements
- Develop Bulk Rates

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CITY OF WEST PALM BEACH FLORIDA EST. 1894

QUESTIONS?

SEAL OF THE TOWN OF PALM BEACH FLORIDA INCORPORATED APRIL 17, 1911

THE TOWN OF SOUTH PALM BEACH FLORIDA 1955

TOWN OF PALM BEACH

MEMORANDUM

TO: Paul Brazil, Director of Public Works

FROM: James M. Bowser, Town Engineer JMB

RE: Private Irrigation Water Supply Systems

DATE: January 22, 2009

Town staff was asked to look into what it would cost for a "typical" Palm Beach homeowner to construct their own independent irrigation water supply system. This is not an easy question and would take a fairly detailed analysis from one of our water consultants that time and funding has not permitted. Town staff has had several discussions with our consultants and the results of these discussions revealed the following.

- A 12 acre site in Manalapan constructed its' own water supply system using Floridan Aquifer, total price, between $400,000 and $450,000.

- Floridan water well permits for individual owners are possible, but wells cost hundreds of thousands of dollars to construct due to the 1200 to 1400 foot depths. These wells are not necessarily drought proof.

- Shallow salt water wells are possible and would provide a water supply that would not have restrictions. Dig too shallow, and the water will be aerobic and hydrogen sulfide is present, requiring a chlorination system. Dig deeper, you would get to an anaerobic zone that avoids the hydrogen sulfide. These salt water aquifers will require a higher degree of treatment, costing more than a Floridan source.

- Treatment facilities will need to be sized to irrigation demand. To minimize treatment capacity, storage is needed. A pressurized system will need to be built. If requested, several scenario's can be developed and priced.

- Electrical service and treatment facility housing needs will be tailored to the system design.

- Ballpark, the cheapest systems will likely exceed $100,000 with ongoing operation and maintenance costs,

c. Peter Elwell, Town Manager
Sarah Hannah, Assistant Town Manager

City of West Palm Beach, Florida

Estimate of Gallon per Capita Per Day for the Town of Palm Beach

Line No.		Fiscal Year 2009 Single Family Residential	SRF and MF Residential	Total Town of Palm Beach (2)
1	Total Water Sales (ccf) (1)	1,226,662	2,205,898	2,961,994
2	Total Single Family Units	2,206	2,206	2,206
3	Total Multi-family Units	0	6,807	6,807
4	Total Residential Units Recognized	2,206	9,013	9,013
5	Water Use per Month per Residential Unit (ccf)	46.34	20.4	27.39
6	Water Use per Month per Residential Unit (gallons)	34,662	15,259	20,488
7	Average Daily Flow per Residential Unit	1,139	502	674
8	Assumed Household Size (3)	1.81	1.81	1.81
9	Household Per Capita Per Day Flow Estimate	629	277	372

Footnotes:

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(1) Water sales forecast based on the Water, Wastewater, and Stormwater Rate and Charge Study prepared by PRMG dated March 24, 2008.

(2) Includes all water sales, including irrigation and commercial use.

(3) Household size derived from demographic information published on the Nationmaster.com website (www.nationmaster.com/encyclopedia/Palm-Beach, -Fl). Note that the family size for the Town was 2.38 persons per household.

based firm Carrère and Hastings and helped establish the Palm Beach winter "season" by constant entertaining. The town was incorporated on April 17, 1911.

Geography

Palm Beach is the easternmost town in Florida, located on a sixteen-mile-long barrier island, centered at 26°42′54″N, 80°2′22″W (26.715067, -80.039371).[4]

According to the U.S. Census Bureau, the town has a total area of 27.0 km^2 (10.4 mi^2). 10.2 km^2 (3.9 mi^2) of it is land and 16.9 km^2 (6.5 mi^2) of it is water. The total area is 62.45% water.

Demographics

As of the 2000 census, over half the population (52.6%) are 65 years of age or older, with a median age of 67 years. 9.4% are under the age of 18, 1.5% are from 18 to 24, 11.5% are from 25 to 44, and 25.0% from 45 to 64. For every 100 females there are 79.3 males. For every 100 females age 18 and over, there are 77.0 males.

Town of Palm Beach

The per-capita income for the town is $109,219. Males have a median income of $71,685 versus $42,875 for females. 5.3% of the population and 2.4% of families are below the poverty line. 4.6% of those under the age of 18 and 2.9% of those 65 and older are living below the poverty line.

The racial makeup of the town is 96.00% White (93.8% were Non-Hispanic White,) [5] 2.57% Black or African American, 0.53% Asian, 0.04% Native American, 0.02% Pacific Islander, 0.21% from other races, and 0.63% from two or more races. 2.56% of the population are Hispanic or Latino of any race.

$\frac{10,468}{5,789} = 1.81$

The 10,468 people in the town are organized into 5,789 households and 3,021 families. The population density is 1,031.1/km^2 (2,669.2/mi^2). There are 9,948 housing units at an average density of 979.8/km^2 (2,536.6/mi^2). 7.7% of the households have children under the age of 18 living with them, 48.1% are married couples living together, 3.3% have a female householder with no husband present, and 47.8% are non-families. 42.6% of all households are made up of individuals and 27.6% have someone living alone who is 65 years of age or older. The average household size is 1.81 and the average family size is 2.38.

Many of Palm Beach's residents are affluent, with a median household income of $94,562 and a median family income of $137,867. The town's affluence, and its "abundance of pleasures" and "strong community-oriented sensibility" were cited when it was selected in June, 2003 as America's "Best Place to Live" by *Robb Report* magazine.

As of 2000, speakers of English was the first language of 87.81% of all residents, while French comprised 4.48%, Spanish consisted of 3.65%, German made up 2.16%, Italian speakers made up 0.45%, Yiddish made up 0.36%, Russian was at 0.30% (even though those of Russian ancestry made up 10.30% of the population), City of West Palm Beach

As of the census[2] of 2000, there are 82,103 people, 34,769 households, and 18,253 families residing in the city. The population density is 574.9/km□ (1,488.9/mi□). There are 40,461 housing units at an average density of 283.3/km□ (733.8/mi□). The racial makeup of the city is 58.09% White, 32.21% African American, 0.33% Native American, 1.46% Asian, 0.16% Pacific Islander, 4.35% from other races, and 3.40% from two or more races. 18.21% of the population are Hispanic or Latino of any race.

$$\frac{82{,}103}{34{,}769} = 2.36$$

There are 34,769 households out of which 22.4% have children under the age of 18 living with them, 34.3% are married couples living together, 13.6% have a female householder with no husband present, and 47.5% are non-families. 37.6% of all households are made up of individuals and 11.8% have someone living alone who is 65 years of age or older. The average household size is 2.26 and the average family size is 3.02.

In the city the population is spread out with 21.3% under the age of 18, 9.8% from 18 to 24, 31.5% from 25 to 44, 21.4% from 45 to 64, and 16.0% who are 65 years of age or older. The median age is 37 years. For every 100 females there are 97.3 males. For every 100 females age 18 and over, there are 94.8 males.

The median income for a household in the city is $36,774, and the median income for a family is $42,074. Males have a median income of $30,221 versus $26,473 for females. The per capita income for the city is $23,188. 18.9% of the population and 14.5% of families are below the poverty line. Out of the total population, 29.2% of those under the age of 18 and 14.8% of those 65 and older are living below the poverty line.

The city has Palm Beach International Airport, which also serves Palm Beach County, Florida.

External links

- West Palm Beach official website (*http://www.cityofwpb.com/*)
- **Maps and aerial photos**
  - Street map from Mapquest (*http://www.mapquest.com/maps/map.adp?latlongtype=decimal&latitude=26.709992&longitude=-80.064373&zoom=6*) or Google (*http://maps.google.com/maps?ll=26.709992,-80.064373*)
  - Topographic map from Topozone (*http://www.topozone.com/map.asp?lat=26.709992&lon=-80.064373&s=200&size=m&layer=DRG100*)
  - Aerial photograph from Microsoft Terraserver (*http://terraserver.microsoft.com/map.aspx?t=1&s=14&lon=-80.064373&lat=26.709992&w=750&h=500*)

☒ Flag of Florida

Regions of Florida

Central Florida | Emerald Riviera | First Coast | Florida Panhandle | Florida Keys | Lee Island Coast | Nature Coast | Orlando Area | Redneck Riviera | Space Coast | Treasure Coast | South Florida | Sun Coast | Tampa Bay Area

Largest Cities

Cape Coral | Clearwater | Coral Springs | Fort Lauderdale | Hialeah | Hollywood | Jacksonville | Miami | Miramar | North Miami | Orlando | Pembroke Pines | Plantation | Pompano Beach | Port St. Lucie | St. Petersburg | Sunrise | Tallahassee | Tampa | **West Palm Beach**

Counties

From: EBalbis@wpb.org
To: SHannah@TownofPalmBeach.com
Date: 12/03/2008 01:26 PM
Subject: Fw: WPB/NYC Water Quality Data

Sarah,

We have obtained information about the water supply in NYC as requested. Note that the City of NY produces about 33 times the amount of water than the City of West Palm Beach. We tried to compile data that can be comparable. However, NYC act as their own State agency and track different parameters than the State of Florida. See below for additional information.

Eduardo E. Balbis, P.E.
Assistant City Administrator
City of West Palm Beach
200 - 2nd Street
West Palm Beach, FL 33402
561-822-1400
561-822-1424 fax

----- Forwarded by Eduardo Balbis/WESTPALM on 12/03/2008 01:26 PM -----
David Hanks/WESTPALM

12/03/2008 10:33 AM

To Eduardo Balbis/WESTPALM@WESTPALM
cc
Subject WPB/NYC Water Quality Data

Please let know if you want any changes made. NCY produces 1.1 billion mgd per day.

Below is what they say about their treatment process:

Water Treatment

All surface water and groundwater entering New York City's distribution system is treated with chlorine, fluoride, food grade phosphoric acid and, in some cases, sodium hydroxide. New York City uses chlorine to meet the New York State Sanitary Code and federal Safe Drinking Water Act (SDWA) disinfection requirements. Fluoride, at a concentration of one part per million, is added to help prevent tooth decay and has been added since 1966 in accordance with the New York City Health Code. Phosphoric acid is added to create a protective film on pipes that reduces the release of metals such as lead from household plumbing. Sodium hydroxide is added to Catskill/Delaware water to raise the pH and reduce corrosivity.

David Hanks
Public Utilities Director
City of West Palm Beach
1000 45th Street, Suite # 15
West Palm Beach, FL 33407
561-494-1046 Work
561-714-4619 Cell

dhanks@wpb.org Water Quality Tables.xls

City of West Palm Beach and New York City Water Quality Tables

	WPB 2007		WPB 2006		WPB 2005		NY City 2007		NY City 2006		NY City 2005			
CONTAMINANTS AND UNIT OF MEASURE	LEVEL DETECTED	RANGE OF RESULTS	LEVEL DETECTED	RANGE OF RESULTS	LEVEL DETECTED	RANGE OF RESULTS	LEVEL DETECTED	RANGE OF RESULTS	LEVEL DETECTED	RANGE OF RESULTS	LEVEL DETECTED	RANGE OF RESULTS	MCL* OR MRDL*	LIKELY SOURCE OF CONTAMINATION
							Stage 1 Disinfectant / Disinfections By - Produce (D/DBP) Parameter							
Trihalomethanes (TTHM) (ppb)*	73.5	6.95 -283.83**	25.29	6.70 - 35.7	21.1	10.9 - 41.9	220	.12-76	246	.10-81	218	19-69	MCL = 80	By-product of drinking water dis infection
Haloacetic Acid (HAA5) (ppb)	30.79	1.82 - 70.0	22.9	9.08 - 37.0	24.4	12.8 - 42.9	218	19 - 62	245	19-69	215	21-69	MCL = 60	By-product of drinking water disinfection
Chloramines (ppm)*	3.1	ND* - 5.8	3.33	1.0 - 4.2	3.1	0.3 - 4.2							MRDL = 4.0	Water additive used to control microbes
Free Chlorine (ppm)	2.4	0.2 - 7.8											MDRL = 4.0	Water additive used to control microbes
CONTAMINANTS AND UNIT OF MEASURE	90th PERCENTILE RESULT	No of Sampling Sites Exceeding the AL	90 th PERCENTILE RESULTS	No of Sampling Sites exceeding the AL	90th PERCENTILE RESULTS	No of Sampling Sites exceeding the AL	LEVEL DETECTED	Range of Results	LEVEL DETECTED	Range of Results	LEVEL DETECTED	Range of Results	MCL	LIKELY SOURCE OF CONTAMINATION
							Lead and Copper (tap water) Round One							
lead (tap water) (ppb)	*16.125.9	13 out of 100	7.6	5 out of 100	ND	0 out of 100	126	ND-122.3	120	ND-123.2	326	ND-11	15	Corrosion of household plumbing systems; erosion of natural deposits
Copper (tap water) (ppm)	0.433	1 out of 100	0.276	0 out of 100	ND	0 out of 100	126	ND-0.320	120	0.022-0.661	117	ND-198	1.3	Corrision of household plumbing systems; erosion of natural deposits;leaching from wood preservatives
							Lead and Copper (Tap Water) Round Two							
Lead (tap water) (ppb)	10.5	8 out of 100											15	Corrosion of household plumbing systems; erosion of natural deposits
Copper (tap water) (ppm)	0.352	0 out of 100											1.3	Corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Contaminants and unit of measure	Highest single measurement	The lowest monthly percentage of samples meeting regulartory requirements	Highest single measurement	The Lowest Monthly Percentage of Samples meeting Regulartory Requirements	Highest single measurement	The Lowest Monthly Percentage of Samples meeting Regulartory Requirements	LEVEL DETECTED	Range of Results	LEVEL DETECTED	Range of Results	LEVEL DETECTED	Range of Results	MCL	LIKELY SOURCE OF CONTAMINATION
		Turbidity												
Turbidy (ntu)*	0.46	95.6	0.33	97	0.37	100%	10061%	0.8-1.4%	966100%	0.8-1.5%	0%	0%	TT*	SOIL RUNOFF
CONTAMINANTS AND UNIT OF MEASURE	Highest single measurement	Lowesst monthly percentage of samples meeting regulartoty requirements	Highest single measurement	The Lowest Monthly Percentage of Samples meeting Regulartory Requirements	Highest single measurement	The Lowest Monthly Percentage of Samples meeting Regulartory Requirements	LEVEL DETECTED	Range of Results	LEVEL DETECTED	Range of Results	LEVEL DETECTED	Range of Results	MCL	LIKELY SOURCE OF CONTAMINATION
							Total Organic Carbon							
TOTAL ORGANIC CARBON (RATIO)	1.1	1.1 - 1.8	1.1	1.1 - 1.8	1.1	1.1 - 1.2							TT	Naturally present in the environment

CONTAMINANTS AND UNITS OS MEASURE	Highest single measurement	Lowesst monthly percentage of samples meeting regulartoty requirements	Highest single measurement	The Lowest Monthly Percentage of Samples meeting Regulartory Requirements	Highest single measurement	The Lowest Monthly Percentage of Samples meeting Regulartory Requirements	LEVEL DETECTED	Range of Results	LEVEL DETECTED	Range of Results	LEVEL DETECTED	Range of Results	TT	LIKELY SOURCE OF CONTAMINATION
Microbiological Contamanants														
Total Coliform Bacteria	13.3	0	0	0	0	0	0	0						NATURALLY PRESENT
Contaminants and Unit of Measure	Total Number of Positive Samples for Year	MCLG	Highest single measurement	The Lowest Monthly Percentage of Samples meeting Regulartory Requirements	Highest single measurement	The Lowest Monthly Percentage of Samples meeting Regulartory Requirements	LEVEL DETECTED	Range of Results	LEVEL DETECTED	Range of Results	LEVEL DETECTED	Range of Results		LIKELY SOURCE OF CONTAMINATION
Fecal Coliform % Coli	*41	0	0	0	0	0	0	0					0	Human and fecal waste
Contaminants and Unit of Measure	Highest Level Dectected	Range of Results	Highest Level Detected	Range Results	Highest Level Detected	Range Results	LEVEL DETECTED	RANGE OF RESULTS	LEVEL DETECTED	RANGE OF RESULTS	LEVEL DETECTED	RANGE OF RESULTS9661	MCL	LIKELY SOURCE OF CONTAMINATION
Inorganic Contaminants														
Antimony (ppb)	3.4	N/A	0.13	N/A	0.21	N/A							6	discharge from petroleum refineries; fire - retardants; ceramics; electronics; solder
Barium (PPM)	0.0089	N/A	0.0079	N/A		N/A	332	0.002-0.07	319	0.01-0.02	319	0.01-0.04	2	Dishcharge or drilling wastes; discharge from metal refineries; erosion of naturaal deposits
Floride (PPM)	0.946	N/A	0.71	N/A	0.51	N/A	1405	ND-1.3					4	Erosion of natural deposits; discharge from fertilizer and aluminum factories; water additive which promotes strong teeth when at optimum levels between 0.7 and 1.2ppm
Lead (Point of entry) (PPB)	2.7	N/A											15	Residue from man-made pollution such as auto emissions and paint;lead pipe, casing and solder
Nitrates (as Nitrogen) (PPB)	0.678	ND - 0.678	0.12	N/A	0.038	N/A	324	0.2-O.59	321	0.13-0.84	319	0.01-0.04	10	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
Sodium (ppm)	84.6	N/A	33	N/A	34	N/A	332	.4 - .11	319	.6-.12			160	Discharge or drilling wastes; discharge from metal refineries; erosion of natural deposits
Thallium (ppb)	0.067	N/A											2	Leaching from ore-processing sites; discharge from electronics, glass, and drug factories.
Endothal (ppb)	4.4	N/A	4.4	N/A	4.4	N/A							100	Runoff from herbicide use
Gross Alpha Emitters (pCi/l)	1	N/A											15	Erosion of natural deposits
Combine radium (pCi/L	1.3	N/A					6	#VALUE!					5	Erosion of natural deposits

TOP 100 PALM BEACH ACCOUNTS BY AVERAGE MONTHLY CONSUMPTION FY 07-08

	Customer's Name	Address 1	FY 07-08 Average Monthly Consumption in CCF	FY 07-08 Average Monthly Consumption in Gallons	FY 07-08 Average Monthly Bill	Premise Type	Percentage of Total Avg Monthly Consumption for Palm Beach	Percentage of Total Avg Monthly Revenue for Palm Beach
1	BREAKERS PB INC	100 E MAIN ST	5,277	3,947,138	$18,277.80	GEN	2.23%	3.12%
2	OCEAN GRAND RESORTS	2800 S OCEAN BLVD	3,908	2,922,839	$13,305.34	GEN	1.65%	2.27%
3	BREAKERS PB INC	100 VIA BETHESDA	3,009	2,250,962	$10,545.23	GEN	1.27%	1.80%
4	BREAKERS PB INC	100 PINEWALK	2,879	2,153,780	$10,134.22	GEN	1.22%	1.73%
5	TRUMP,DONALD J	1100 S OCEAN BLVD	2,746	2,053,663	$9,826.33	GEN	1.16%	1.68%
6	PALM BEACH TOWERS CO	44 COCOANUT ROW	2,671	1,997,735	$6,435.42	RES-MULT	1.13%	1.10%
7	TOWN OF PALM BEACH	2301 S OCEAN BLVD	1,827	1,366,769	$5,890.04	GEN	0.69%	1.00%
8	2000 CONDOMINIUM ASSOC	2000 S OCEAN BLVD	1,637	1,224,131	$3,675.58	RES-MULT	0.69%	0.63%
9	BEACH POINT CONDO ASSOC	2660 S OCEAN BLVD	1,527	1,142,311	$3,390.44	RES-MULT	0.65%	0.58%
10	COUNTY ROAD PROPERTY LLC	515 N COUNTY RD	1,373	1,026,755	$6,011.29	RES-MULT	0.58%	1.03%
11	PALM BEACH BILTMORE CONDO ASSOC INC	150 BRADLEY PL	1,292	966,309	$2,890.03	RES-MULT	0.55%	0.49%
12	REEF CONDO ASSOC INC	2275 S OCEAN BLVD	1,278	955,714	$2,889.17	RES-MULT	0.54%	0.49%
13	KRAMER,IRWIN	1295 S OCEAN BLVD	1,226	916,933	$4,020.31	RES	0.52%	0.69%
14	2295 S OCEAN BLVD ASSOC	2295 S OCEAN BLVD	1,145	856,115	$3,459.06	RES-MULT	0.48%	0.59%
15	PATRICIAN MGMT CORP	3450 S OCEAN BLVD	1,139	851,627	$3,676.41	RES-MULT	0.48%	0.63%
16	KRAVIS,HENRY R	700 N LAKE WAY	1,078	806,023	$3,100.25	RES-MULT	0.46%	0.53%
17	2100 CONDO ASSOC INC	2100 S OCEAN BLVD	1,027	767,966	$2,517.47	RES-MULT	0.43%	0.43%
18	ENCLAVE OF PB CONDO ASSOC,THE	3170 S OCEAN BLVD	979	732,062	$2,255.78	RES-MULT	0.41%	0.38%
19	OCEAN COVE CONDO	2600 S OCEAN BLVD	977	731,084	$2,255.21	RES-MULT	0.41%	0.38%
20	123 LLC	455 N COUNTY RD	925	691,900	$2,883.96	RES	0.39%	0.49%
21	SCHWARZMAN,STEPHEN	1768 S OCEAN BLVD	908	678,839	$2,882.59	RES	0.38%	0.49%
22	2500 S OCEAN BLVD INC	2500 S OCEAN BLVD	890	666,008	$1,991.55	RES-MULT	0.38%	0.34%
23	SYDELL MILLER	1415 S OCEAN BLVD	887	663,361	$2,873.34	RES	0.37%	0.49%
24	LEVERETT HOUSE INC	110 SUNSET AVE	845	632,233	$1,993.92	RES-MULT	0.36%	0.34%
25	SUTTON PLACE CONDO ASSOC INC	2778 S OCEAN BLVD	838	626,651	$1,992.96	RES-MULT	0.35%	0.34%
26	SUN & SURF	100 SUNRISE AVE	813	608,469	$2,447.50	RES-MULT	0.34%	0.42%
27	BOHL REAL ESTATE MGMT CORP	184 BRADLEY PL	809	604,758	$1,762.83	RES-MULT	0.34%	0.30%
28	STERLING PALM BEACH LLC	10 ROYAL POINCIANA PLZ	792	592,202	$2,869.67	GEN	0.33%	0.49%
29	OASIS III CORP	3120 S OCEAN BLVD	772	577,456	$1,731.67	RES-MULT	0.33%	0.30%
30	WINTHROP HSE COND	100 WORTH AVE	750	560,827	$2,190.64	RES-MULT	0.32%	0.37%
31	KESSLER,PATRICIA	120 CASA BENDITA	730	545,810	$2,261.12	RES	0.31%	0.39%
32	LA PALMA COND APTS	2860 S OCEAN BLVD	720	538,330	$1,866.68	RES-MULT	0.30%	0.32%
33	HENRY MORRISON FLAGLER MUSEUM	1 WHITEHALL WAY	715	534,762	$2,539.20	GEN	0.30%	0.43%
34	BRAZILIAN COURT MGMT INC	300 BRAZILIAN AVE	712	532,921	$2,414.10	GEN	0.30%	0.41%
35	CHOPIN TRUSTEE PB TR,L FRANK	300 N LAKE WAY	666	498,382	$1,901.99	RES	0.28%	0.32%
36	PALM BEACH COUNTRY CLUB	760 N OCEAN BLVD	664	496,672	$2,413.12	GEN	0.28%	0.41%
37	T H COURT LIMITED PARTNERSHIP	363 COCOANUT ROW	662	495,521	$2,178.26	GEN	0.28%	0.37%
38	THE COLONY HOTEL	155 HAMMON AVE	650	485,855	$2,285.71	GEN	0.27%	0.39%

TOP 100 PALM BEACH ACCOUNTS BY AVERAGE MONTHLY CONSUMPTION FY 07-08

	Customer's Name	Address 1	FY 07-08 Average Monthly Consumption in CCF	FY 07-08 Average Monthly Consumption in Gallons	FY 07-08 Average Monthly Bill	Premise Type	Percentage of Total Avg Monthly Consumption for Palm Beach	Percentage of Total Avg Monthly Revenue for Palm Beach
39	RESIDENCES AT SLOAN CURVE,THE	2000 S OCEAN BLVD	645	482,345	$1,445.07	RES-MULT	0.27%	0.25%
40	PELTZ,NELSON	548 N COUNTY RD	643	480,734	$2,161.55	GEN	0.27%	0.37%
41	TAYLOR,TERRY R	780 S OCEAN BLVD	636	475,670	$1,977.13	RES	0.27%	0.34%
42	CLARIDGES CONDO INC,THE	3456 S OCEAN BLVD	617	461,631	$1,950.41	RES-MULT	0.26%	0.33%
43	ROYAL SAXON INC	2840 S OCEAN BLVD	615	460,078	$2,262.94	RES-MULT	0.26%	0.39%
44	WILKENS,FRANK	1491 N OCEAN BLVD	614	459,042	$2,022.24	GEN	0.26%	0.34%
45	2770 CONDOMINUM,THE	2770 S OCEAN BLVD	605	452,885	$1,360.94	RES-MULT	0.26%	0.23%
46	PALM BEACH STRATFORD CONDO ASSOC INC	2580 S OCEAN BLVD	588	439,594	$1,382.49	RES-MULT	0.25%	0.24%
47	PALM BEACH HAMPTON CORP	3100 S OCEAN BLVD	568	424,806	$1,287.78	RES-MULT	0.24%	0.22%
48	VARGAS,VICTOR	1960 S OCEAN BLVD	563	421,182	$1,763.28	RES	0.24%	0.30%
49	DESMARAIS,PAUL	1600 S OCEAN BLVD	562	420,549	$1,860.38	GEN	0.24%	0.32%
50	SUBOTNICK TRUSTEE,STUART	89 MIDDLE RD	560	419,168	$1,769.33	RES-MULT	0.24%	0.30%
51	EMERAUDE CONDO ASSOC	3390 S OCEAN BLVD	556	415,715	$1,293.06	RES-MULT	0.23%	0.22%
52	BATH & TENNIS CLUB INC	1168 S OCEAN BLVD	549	410,710	$1,950.50	GEN	0.23%	0.33%
53	ROSS,STEPHEN M	702 N COUNTY RD	548	410,134	$1,812.82	RES	0.23%	0.31%
54	PALM BEACH HAMPTON CORP	3100 S OCEAN BLVD	548	409,731	$1,254.34	RES-MULT	0.23%	0.21%
55	389 CORP	389 S LAKE DR	543	406,337	$1,237.91	RES-MULT	0.23%	0.21%
56	PRESIDENT OF P B CONDO INC	2505 S OCEAN BLVD	542	405,646	$1,657.75	RES-MULT	0.23%	0.28%
57	HALCYON CONDO ASSOC	3440 S OCEAN BLVD	542	405,128	$1,333.89	RES-MULT	0.23%	0.23%
58	LA BONNE VIE COND AP	3475 S OCEAN BLVD	541	404,726	$1,835.83	RES-MULT	0.23%	0.31%
59	HAMMONDS,SANDRA	1275 S OCEAN BLVD	541	404,668	$1,955.04	RES	0.23%	0.33%
60	BEACH CLUB INC	755 N COUNTY RD	541	404,610	$1,959.22	GEN	0.23%	0.33%
61	ATRIUMS OF PB MGMT	3400 S OCEAN BLVD	530	396,325	$1,770.74	RES-MULT	0.22%	0.30%
62	BIENSTAR	151 GRACE TRL	529	395,692	$1,276.45	RES-MULT	0.22%	0.22%
63	DU PONT,WILLIS H	1860 S OCEAN BLVD	521	389,535	$1,473.75	RES-MULT	0.22%	0.25%
64	HALCYON CONDO ASSOC INC	3440 S OCEAN BLVD	520	389,018	$1,260.18	RES-MULT	0.22%	0.21%
65	AMBASSADOR SOUTH DEV CORP	2774 S OCEAN BLVD	518	387,637	$1,627.66	RES-MULT	0.22%	0.28%
66	105 CLARENDON CORP	105 CLARENDON AVE	514	384,472	$1,560.62	RES	0.22%	0.27%
67	123 LLC	455 N COUNTY RD	507	379,236	$2,304.58	GEN	0.21%	0.39%
68	MERIDIAN OF PALM BCH	3300 S OCEAN BLVD	506	378,488	$1,188.94	RES-MULT	0.21%	0.20%
69	CLARK,JAMES H	1500 S OCEAN BLVD	504	377,222	$1,738.51	GEN	0.21%	0.30%
70	PERGAMENT,LOUIS	333 SUNSET AVE	503	376,030	$1,420.95	RES-MULT	0.21%	0.24%
71	SUN & SURF 130 ASSOC	130 SUNRISE AVE	492	368,304	$1,721.05	RES-MULT	0.21%	0.29%
72	ATRIUMS II OF PB	3360 S OCEAN BLVD	483	361,514	$1,529.28	RES-MULT	0.20%	0.26%
73	BLACK,CONRAD	1930 S OCEAN BLVD	476	356,278	$1,453.39	RES	0.20%	0.25%
74	PALM BEACH TOWNHOUSES LTD PTN	230 BRADLEY PL	471	352,041	$964.09	RES-MULT	0.20%	0.16%
75	CARLYLE HOUSE ASSOC INC	2773 S OCEAN BLVD	466	348,913	$1,504.13	RES-MULT	0.20%	0.26%
76	L'ERMITAGE A PB CONDO ASSCINC	200 BRADLEY PL	454	339,913	$1,055.41	RES-MULT	0.19%	0.18%
77	COVE CONDOMINIUM ASSOCIATION INC	2784 S OCEAN BLVD	451	337,348	$1,420.04	RES-MULT	0.19%	0.24%
78	300 SO OCEAN BLVD CORP OF PB	300 S OCEAN BLVD	444	331,898	$1,010.42	RES-MULT	0.19%	0.17%
79	PERIODICAL DSTRBTRS	691 N COUNTY RD	441	330,213	$1,344.31	RES-MULT	0.19%	0.23%
80	330 SOUTH OCEAN INC	330 S OCEAN BLVD	440	328,832	$987.36	RES-MULT	0.19%	0.17%

TOP 100 PALM BEACH ACCOUNTS BY AVERAGE MONTHLY CONSUMPTION FY 07-08

	Customer's Name	Address 1	FY 07-08 Average Monthly Consumption in CCF	FY 07-08 Average Monthly Consumption in Gallons	FY 07-08 Average Monthly Bill	Premise Type	Percentage of Total Avg Monthly Consumption for Palm Beach	Percentage of Total Avg Monthly Revenue for Palm Beach
81	APPLEBAUM,EUGENE	325 VIA LINDA	433	323,884	$1,238.27	RES	0.18%	0.21%
82	THE REGENCY OF P B INC	2760 S OCEAN BLVD	431	322,388	$1,421.00	RES-MULT	0.18%	0.24%
83	KIRKLAND HOUSE CONDO ASSOCIATION INC	101 WORTH AVE	429	321,007	$956.68	RES-MULT	0.18%	0.16%
84	MARTIN GRUSS	1574 S OCEAN BLVD	427	319,741	$1,454.71	GEN	0.18%	0.25%
85	CONDO ASSOC OF OCEAN TOWERS INC	170 N OCEAN BLVD	426	318,418	$1,214.23	RES-MULT	0.18%	0.21%
86	SOCIETY OF THE FOUR ARTS	417 ROYAL PALM WAY	423	316,511	$1,220.88	GEN	0.18%	0.21%
87	ATRIUMS OF PB MGMT	3400 S OCEAN BLVD	418	312,491	$1,357.12	GEN	0.18%	0.23%
88	NESBITT II,ABRAM	79 MIDDLE RD	415	310,420	$1,182.56	RES-MULT	0.18%	0.20%
89	LAUDER,JOSEPH	126 S OCEAN BLVD	412	308,176	$1,154.42	RES-MULT	0.17%	0.20%
90	BEACH CLUB INC	220 COUNTRY CLUB RD	410	306,947	$1,201.81	GEN	0.17%	0.21%
91	TRES VIDAS	2335 S OCEAN BLVD	407	304,724	$894.77	RES-MULT	0.17%	0.15%
92	MERIDIAN OF PALM BCH	3300 S OCEAN BLVD	405	302,940	$983.57	RES-MULT	0.17%	0.17%
93	CUNNINGHAM,JOHN	353 EL BRILLO WAY	404	302,480	$1,243.20	RES	0.17%	0.21%
94	MONTGOMERY,ROBERT M	1800 S OCEAN BLVD	402	300,869	$1,141.35	RES-MULT	0.17%	0.19%
95	THORNTON,JOHN L	1236 S OCEAN BLVD	393	294,285	$1,229.17	RES	0.17%	0.21%
96	LAKE TOWERS ASSOC INC	250 BRADLEY PL	393	294,017	$1,054.34	RES-MULT	0.17%	0.18%
97	PICOWER,JEFFRY M	1410 S OCEAN BLVD	389	291,030	$1,088.20	RES-MULT	0.16%	0.19%
98	EVERGLADES CLUB	409 COCOANUT ROW	385	287,922	$1,345.22	GEN	0.16%	0.23%
99	589 NORTH COUNTY ROAD LLC	589 N COUNTY RD	383	286,110	$1,156.78	RES-MULT	0.16%	0.20%
100	OCEANSIDE PALMS ESTATE CORP	641 N COUNTY RD	375	280,385	$1,049.12	RES-MULT	0.16%	0.18%
	Total for Top 100		**82,339**	**61,589,614**	**$ 247,769.35**			
	Total for Palm Beach		236,498	176,900,442	$586,175.22			
	% of Use/Revenue for Top 100		35%	35%	42%			
	* Top 10% of Consumption							
	** Top 10% of Revenue							
	Revenue produced by use and fixed service chrg only				$561,794.65			
	% of Revenue for Top 100 (use & service charge)				44%			

Water Committee
Town Sewage Effluent
Jim Bowser to: Patricia Gayle-Gordon 01/22/2009 01:54 PM

Pat, I believe one of the questions asked was what was the sewage flows to West Palm Beach. Here is an email to Peter sent on 1/9/09.

James M. Bowser, P.E.
Town Engineer
Town of Palm Beach
Public Works Department
Post Office Box 2029
Palm Beach, Florida 33480-2029
email: jbowser@townofpalmbeach.com
561-838-5440
Fax : 561-835-4691

----- Forwarded by Jim Bowser/PalmBeach on 01/22/2009 01:56 PM -----

From: Jim Bowser/PalmBeach
To: Peter B Elwell/PalmBeach@PalmBeach
Cc: Paul Brazil/PalmBeach@PalmBeach, Eric Brown/PalmBeach@PalmBeach, Douglas Terry/PalmBeach@PalmBeach
Date: 01/09/2009 10:36 AM
Subject: Town Sewage Effluent

Peter, as requested, attached is sewage flow data from our Lake Worth Billings and ECRWRF monthly report. I am seeking the peak daily flows, but that is going to take additional time.

Base upon the monthly flows, here is the average daily flow for each entity in Fiscal Year 2008 expressed as million gallons a day:

Month	WPB	LW
Oct	2.70	0.654
Nov	2.39	0.593
Dec	2.23	0.627
Jan	2.33	0.668
Feb	2.36	0.691
Mar	2.23	0.672
Apr	2.12	0.561
May	2.02	0.408
Jun	2.09	0.389
Jul	2.22	0.552
Aug	2.33	0.537
Sep	2.54	0.563
Yearly Ave	2.30	0.563

Total average daily flow from Town to ECRWRF 2.863 million gallons a day.

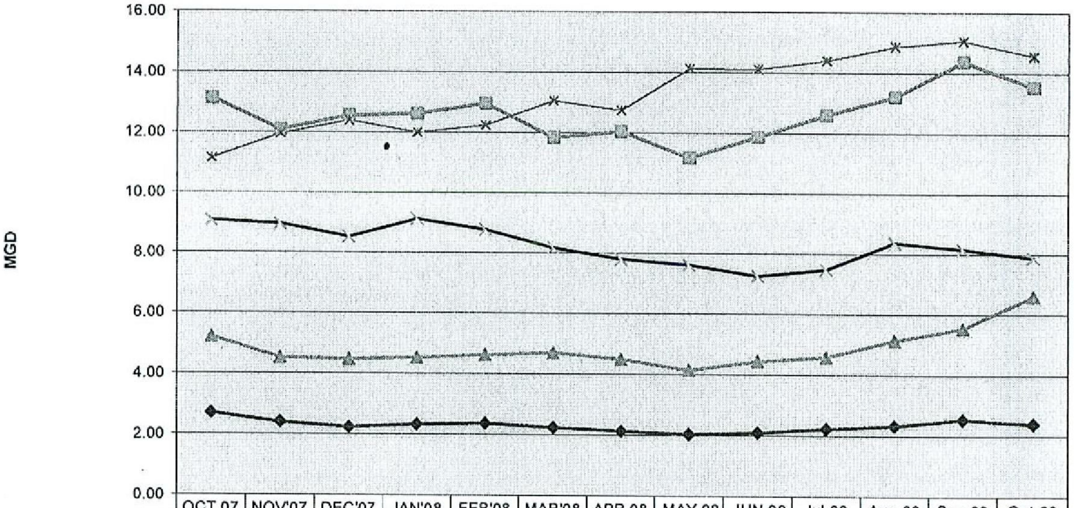
Sewage Flows WPB and LW FY 2008.pdf

James M. Bowser, P.E.

1. Plant Influent Flows: FOR MONTH OF OCTOBER, 2008.

Entity	Average Daily Influent Flow (MGD)		
	Flow	Reserve Cap	% of Capacity
Palm Beach	2.39	5.00	47.8%
West Palm Beach	13.55	17.00	79.70%
Riviera Beach	6.59	8.00	82.37%
Palm Beach County	14.57	21.50	67.76%
Lake Worth	7.88	12.50	63.04%
ECRWRF TOTAL	44.98	64.00	70.28%

Average Daily Influent Flow (MGD)



	OCT 07	NOV'07	DEC'07	JAN'08	FEB'08	MAR'08	APR 08	MAY 08	JUN 08	Jul-08	Aug-08	Sep-08	Oct-08
◆ Palm Beach	2.70	2.39	2.23	2.33	2.36	2.23	2.12	2.02	2.09	2.22	2.33	2.54	2.39
■ West Plm Bch	13.13	12.09	12.56	12.62	12.96	11.85	12.05	11.18	11.88	12.61	13.22	14.38	13.55
▲ Riv Beach	5.20	4.51	4.46	4.52	4.61	4.69	4.48	4.13	4.43	4.58	5.13	5.53	6.59
× Lake Worth	9.07	8.95	8.52	9.12	8.76	8.17	7.80	7.61	7.25	7.46	8.37	8.16	7.88
✱ Plm Bch Cty	11.14	11.95	12.39	12.00	12.24	13.06	12.75	14.13	14.12	14.40	14.87	15.06	14.57

"An Equal Opportunity Employer"

Drinking Water Quality Evaluation:
Analysis of the City of West Palm Beach's Potable Water Product Delivered to The Town of Palm Beach

HSA Project No. 803-0319

Prepared for:

Town of Palm Beach
Public Works Department
951 Old Okeechobee Rd., Suite D
West Palm Beach, Florida 33401

Prepared by:

HSA Engineers & Scientists
1486-A Skees Road
West Palm Beach, FL 33411

January 2009

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FIGURES

FIGURE 1 Site Location Map

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TABLE 1 Test Results Comparative to Regulatory Acceptable Maximum Limits per Chapter 62-550, Florida Administrative Code

APPENDICES

APPENDIX A Laboratory Report of Test Results

EXECUTIVE SUMMARY

Recent Drinking Water Testing Completed and the Results

The City of West Palm Beach (City) treats surface waters at their downtown facility and produces drinking water for the residents of West Palm Beach. Residents of the Town of Palm Beach (Town) receive potable water from the City through a franchise agreement that expires in the year 2029. Due, in part, to the highly publicized " precautionary boil water" notice issued by the City in September of 2007, concerns arose regarding the overall safety of the drinking water supply being provided to the Town. Accordingly, HSA Engineers and Scientists was asked to collect and analyze additional samples from the water supply. These additional samples were collected by HSA personnel on November 14, 2008 and were submitted to a laboratory independent of the ones used by the City for their routine drinking water testing requirements mandated by the U.S. Environmental Protection Agency (USEPA) and the Florida Department of Environmental Protection (FDEP). There are more than 90 testing parameters that are required to be analyzed on drinking water supplies by the USEPA and the FDEP. HSA collected samples and tested for all of these drinking water parameters and the detailed results are supplied in the enclosed tabular summary.

Also as shown in the attached detailed summary table, all of the testing results obtained from our recent sampling passed and all constituents were well below the allowable limits established by State and Federal regulations.

What are Trihalomethanes (THMs) and Why Did We Receive a Notice That They Were Elevated?

During the precautionary boil water notice that occurred during the latter part of 2007, the City added more chlorine to their finished drinking water to ensure adequate bacterial kill. Chlorine reacts with natural organics (that cause variations in the water’s color) producing a group of compounds called Trihalomethanes (THMs). Up to a point, the higher the chlorine dose added, the higher the THM concentrations produced. The USEPA has established a limit of 80 parts per billion (ppb) for drinking water supplies. In a few samples collected by the City during the ‘boil water notice’ time period, elevated THM test results were obtained due to the additional chlorine in the drinking water. This represented a one-time spike in THM results and the current level is well below the 80 parts per billion limit. During the special testing completed by HSA, the THM level was measured at slightly more than 50 parts per billion, well below the acceptable limit set by the regulators.

What Do I Need To Do To Ensure My Drinking Water is Safe?

Aside from the recent test results collected and analyzed by HSA, we reviewed historical test results, also summarized in the enclosed table. The City produces a safe drinking water of high quality based on the test results over the last several years. According to the USEPA and the FDEP established standards, the City's drinking water supply is of good quality and can be consumed directly without concern. For those who want an added measure of protection, substituting bottled drinking water is an option or under the kitchen counter reverse osmosis (RO) filtration system can be installed as added intermediary treatment to provide an excellent source of high quality of drinking water. These RO units are not cost prohibitive, can be easily installed, and can usually supply sufficient drinking water for a typical household. A separate tap is usually installed near the standard sink faucet so the RO water is delivered on demand. There are several local reputable vendors that can provide free quotation for installing under the kitchen counter RO units. Please note that the typical RO unit we are referring to does not treat the entire household water supply but rather just the water intended for drinking or cooking purposes.

To add a layer of confidence to residents' concerns about the quality of the City's drinking water, we also recommend that the Town establish a primary point of contact for the City for courtesy notification and/or discussion of real time details related to issues with the City's treatment and distribution processes. This could potentially avoid dramatized response to typically less-detailed public notification.

INTRODUCTION

Residents of Palm Beach receive potable water from the City of West Palm Beach (City) through a franchise agreement Town of Palm Beach (Town). As required under rule 62-550, Florida Administrative Code, to protect the public health and ensure the quality of the delivered potable water product, these taps are routinely sampled by the City of West Palm Beach's Public Utilities Department for specified monitoring parameters. Concerned about assuring the quality of the potable water product delivered to Town residents by the City, the Town authorized HSA Engineers & Scientists (HSA) to conduct a one-time sampling event from two of the sampling taps on the potable water distribution system (piping) serving the Town. Collected samples were targeted for laboratory analyses for regulated water chemistry parameters, constituents, and microbiologics most likely to be present in South Florida drinking water supplies.

CITY OF WEST PALM BEACH'S DRINKING WATER MONITORING PROGRAMS

HSA evaluated the City's monitoring program and most recent results. Steve Schmidt, laboratory manager at the City's water treatment plant and Chris Saliba of U.S. Water, Corporation, the City's treatment system process and monitoring consultant, assisted with the acquisition of sampling protocols and laboratory analytical documentation related to the City's drinking water monitoring program. Discussions with both yielded important information about the City's drinking water monitoring and quality assurance programs. In addition, records of the City's Monthly Operating Records (MORs) and recent results from the City's water monitoring programs were obtained from the Palm Beach County Health Department (part of the State of Florida's Department of Health, FDOH).

The City conducts two programs to monitor its drinking water quality, a Compliance Monitoring Program (compliance) and a Routine Monitoring Program (routine). Sampling locations for the City's two monitoring programs include the surface water impoundments, inbound raw water, aquifer storage and recovery (ASR) wells, treatment plant points of entry, distribution system points of entry, and distribution system pumps and sampling taps. While Routine program sampling events generally range from monthly to "as needed", compliance program sampling events generally range from daily to quarterly to annually to sampling for contaminants (like asbestos) every ninth year.

To monitor the drinking water quality delivered to the Town, the City conducts routine sampling at ten (10) permanent and temporary compliance distribution system sampling points (taps) situated within the Town's boundaries. These include:

- Distribution System Tap 3230 (located at 3230 S. Ocean Dr.);
- Distribution System Tap 2780 (located at 2780 S. Ocean Dr.);
- Distribution System Tap PBGC (located at the Palm Beach Golf Course);
- Distribution System Tap SOFS (located at the South Fire Station);
- Distribution System Tap ISRD (located at Island Rd.);
- Distribution System Tap RPBR (located at Royal Poinciana Blvd. X Bradley Pl.);
- Distribution System Tap NOFS (located at the North Fire Station);
- Distribution System Tap 702 (located at 702 N. County Rd.);
- Distribution System Tap LINL (located at List Rd. X N. Lake Wy.); and
- Distribution System Tap IDSE #6 (located at the north end of Ocean Blvd.);

An eleventh distribution system tap, 4201, is located at 4201 South Ocean Boulevard (in the South Palm Beach municipality), outside the jurisdiction of the Town. The Phipps Park "Booster" Pumping Station (PS) is located within the Town's jurisdiction. The Phipps Park "Booster" is not a point of entry (POE) to the Town's distribution system. The City's map indicates the locations of the sampling taps, the booster pump station, and a one million gallon (1 MG) storage tank within the Town's jurisdiction. **Figure 1** depicts the distribution system sampling taps, "booster" pumping station, and storage tank located within the Town's boundary.

The City conducts annual compliance sampling at several sampling locations, most notably from the first point of entry (POE) to the distribution system. According to the City's Water Treatment Plant laboratory manager, the first POE is the tap located in the Water Treatment Plant's analytical laboratory.

POINTS OF ENTRY FOR THE CITY'S DELIVERY OF DRINKING WATER TO THE TOWN

Plans of the distribution system serving the Town, provided by the Town's Public Works Department (PWD), identified five potable water transmission mains (large diameter pipes) crossing the Intracoastal Waterway and connecting to the distribution system to deliver the City's potable water product to the Town. These five pipes include:

- A 24-inch diameter transmission main crossing the Intracoastal Waterway (ICW) from/to 5th Street (in the City) to the eastern flank of the Royal Poinciana Bridge (in the Town):
- A 16-inch diameter water main crossing the ICW from/to 45th Street (in the City) to the intersection of North Lake Way and Orange Grove Road (in the Town);
- A 16-inch diameter water main crossing the ICW from the southern end of Flagler Drive (in the City) to the west end of "Sloan's Curve (on State Road A1A, in the Town);
- A 16-inch diameter water main crossing the ICW from the intersection of Southern Boulevard with Flagler Drive (in the City) to the eastern flank of the Southern Boulevard Bridge (in the Town); and
- A 20-inch main crossing the ICW from the City to Everglades Island, near Barcelona Avenue (in the Town).

Figure 1 also depicts the approximate ICW crossings and points of entry (POEs) of the transmission mains to the Town. The scale of the map does not allow an accurate depiction of the POEs associated with the mains. Maps of the Town's distribution system provided by the PWD, generated at a significantly larger scale, were used to reference the locations of the POEs for the transmission mains.

SAMPLING AND ANALYSIS OF THE DRINKING WATER PRODUCT DELIVERED TO THE TOWN

As a means to independently evaluate the quality of the drinking water being delivered to the Town, on November 14, 2008 HSA, accompanied by an employee of the City's Public Utilities Department, sampled distribution system tap IDSE #6, representing the northern-most extent of the system, and tap 3230, representing the southern-most extent of the system,. **Figure 1** depicts these sampling tap locations.

Sampling was performed by modification of the City's (distribution system) General Sampling Procedures to reflect the intended exclusion of sampling equipment, field parameter testing, associated equipment calibration requirements. Samples were collected in laboratory-supplied, unpreserved and pre-preserved containers. As required by select analytical methodologies, at the sampling locations preservative was added to those sample containers immediately prior to filling or to the water sample immediately prior to sealing the sample container.

Collected water samples were submitted to FDOH/NELAC-certified testing laboratories for analysis for typical public potable water system routine and compliance monitoring parameters including Primary Drinking Water Standards (excluding select Disinfection Byproducts, Haloacetic Acids; Bromite; and Chlorite), for Secondary Drinking Water Standards, and for Total Coliform as listed in the Florida Administrative Code rule 62-550. Test America Laboratories performed all of the analyses for chemical parameters. Jupiter Environmental Laboratories performed the analyses for the microbiologics.

RESULTS FROM INDEPENDENT ANALYSIS OF THE CITY'S DRINKING WATER PRODUCT

Results of laboratory analysis for target Primary and Secondary Drinking Standards yielded all chemical and physical parameters below method detection limits (MDLs) or less than respective maximum contaminant limits (MCLs).

Results of laboratory analysis for target microbiologicals yielded an absence of Total Coliform in the water samples collected from northern-most Tap A (IDSE #6) and southern-most

Tap B (3230). **Table 1** arrays the target Primary and Secondary Drinking Standards, regulated MCLs, required sampling frequency, and laboratory analytical results for the November 14, 2008-collected water samples.

Appendix A contains the laboratory analytical reports from HSA's November 14, 2008 sampling event.

COMPARISON TO RECENT CITY MONITORING PROGRAM RESULTS

The City's most recent annual compliance monitoring event for Primary and Secondary Drinking Water Standards was performed in June 2008. The sample of 'finished' water product was collected at a sampling point (laboratory tap) at the water treatment plant. Analysis was performed by the City's FDOH/NELAC-certified, vendor analytical laboratory, Genapure. Analysis yielded all target parameter results below method detection limits (MDLs) or less than respective maximum contaminant limits (MCLs) per Chapter 62-550, F.A.C.

The City's most recent quarterly routine monitoring event for Nitrate and Nitrite was performed in August 2008. The sample of 'finished' water product was also collected at the water treatment plant's laboratory tap. Analysis was again performed by the City's vendor analytical laboratory, Genapure. The detected concentration of Nitrate was less than the MCL (10 mg/L). The concentration of Nitrite was below the MDL (< 0.053 mg/L). Nitrate concentrations from HSA's November 2008 sampling event are lower than either result reported from the City's annual or latest quarterly sampling from the water treatment plant's laboratory tap. The difference between these results is not relevant since the reported concentrations from the City and from HSA's sampling event are still less than the MCL.

Table 1 includes a comparative array of the City's monitoring program results to the results from HSA's November 2008 distribution system tap sampling for the target Primary and Secondary Drinking Standards.

APPLICATION OF DISINFECTION CHEMICALS, BYPRODUCTS, AND THE EFFECT ON TASTE

To eliminate the presence of microbiologics, such as Coliform bacteria, the City applies chlorine at the treatment plant to disinfect the processed supply water. This treatment process results in the formation of chemical compounds in the potable water product known as Disinfection Byproducts (DBPRs). The allowable concentrations of DBPRs in drinking water are set as Standards in FDEP rule 62-550, F.A.C.

The latest quarterly (3-month) reporting period for the City's weekly routine monitoring of DBPRs (Total Trihalomethanes, TTHMs) ended September 2008. The samples of water product are regularly collected at a series of distribution system sampling taps. Analysis was performed by the City's analysts at the Water Treatment Plant's laboratory. Results from HSA's sampling of the Town's drinking water from northern-most Tap A (IDSE #6) are directly compared to the City's routine sampling of drinking water from distribution system tap LINL (closest to Tap A). Results from HSA's sampling of the Town's drinking water from southern-most Tap B (3230) are compared directly to those from the City's sampling of that tap. TTHM concentrations from HSA's November 2008 sampling event are slightly higher than the averages of the results reported from the City's latest quarterly sampling from tap LINL and tap 3230, respectively. The difference between these results is not relevant since the reported concentrations from the City and from HSA's sampling event are still less than the MCL. It is noted that the concentration of TTHMs reported from the City's annual compliance event (collected at the Treatment Plant) is close to the MCL. This is not unexpected as the sampling location (treatment plant laboratory tap) is much closer to the point of disinfection than the distribution system sampling taps. **Table 1** includes a comparative array of the detected TTHM's from City's monitoring program to those detected from HSA's November 2008 sampling event as well as the TTHM Standards per rule 62-550, F.A.C.

The City Public Utilities Department acknowledges that to keep the potable water product free of microbiologics occasionally requires increasing the concentration of disinfecting chlorine added to the supply water. This results in brief incidences of potable water product with a notable change in the taste and higher concentrations of DBPRs. Concentrations of DBPRs and the stronger taste of chlorine subside with the inevitable reduction of chlorination.

CONCLUSION

As a measure of the quality of the drinking water product being delivered to the Town by the City, results from HSA's November 2008 collection of potable water from the northern-most and southern-most distribution system sampling taps revealed target regulated drinking water parameters at concentrations below the MCL standards established in FDEP rule 62-770, F.A.C.

A comparative of the results obtained from HSA's sampling event to the City's reported annual and quarterly results from 2008 monitoring events found minor variations in reported concentrations for select parameters (see **Table 1**). These variations pose no concern for the quality of the potable water product being delivered to the Town since all parameter concentrations reported from the City's monitoring events and by HSA's sampling event are less than respective MCLs.

Comparison of a three-year average of the concentrations of Primary and Secondary Drinking Water Standards from the City's annual compliance monitoring events (circa 2006, 2007, and 2008) to the results from HSA's November 2008 distribution system tap sampling reveals relative equivalence with irrelevant differences between select parameters concentrations since the averaged City results are less than respective MCLs (see **Table 1**).

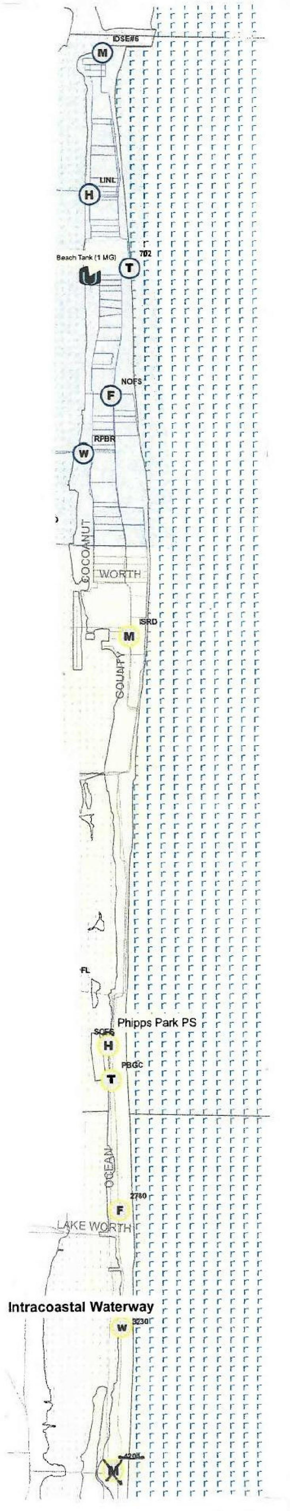
With the exception of the occasional spike in concentrations of DBPRs (and corresponding stronger taste of chlorine in the delivered drinking water) resulting from the City's need to increase the application of sanitizing chemicals (i.e. chlorine) to treat supply water, HSA concludes that the quality of the potable water product delivered to the Town by the City meets or beats the criteria for the standards established under rule 62-550, F.A.C.

Prepared by:

HSA Engineers & Scientists
A member of the CRA family of companies

Michael R. Fisher, P.G. Senior Project Manager	Thomas Emenhiser Regional Manager

Attachments: Figure 1
Table 1
Appendix A – Laboratory Reports of Test Results


IDSE#6
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Beach Tank (1 MG)
702
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NOFS
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COUNTY
FL
Phipps Park PS
SOFS
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PBGC
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OCEAN
2780
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LAKE WORTH
Intracoastal Waterway
3230
W
4201
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After Malcolm Pirnie, Exhibit 3
"City of West Palm Beach/ Water Distribution System
Recommended TCR Sampling Sites and Schedule"

Legend

Sampling Schedule

E	Every day
F	Fri
M	Mon
A	Mon and Thu
H	Thu
T	Tue
W	Wed

Sampling Route

■	North Palm Beach
🟨	South Palm Beach

Scale

0 1.5 3 Miles

Status	Region	Abbreviation	Street address	Schedule
Existing	North Palm Beach	702	702 N. County Rd.	Tue
Existing	North Palm Beach	LINL	List Rd and N. Lake Way	Thu
Existing	North Palm Beach	NOFS	NOFS North Fire Station	Fri
Existing	North Palm Beach	RPBR	Royal Poinciana and Bradley Pl.	Wed
New	North Palm Beach	IDSE#6	North end of ocean blvd	Mon
Existing	South Palm Beach	2780	2780 S. Ocean Blvd	Fri
Existing	South Palm Beach	3230	3230 S. Ocean Drive	Wed
Existing	South Palm Beach	4201	4201 S. Ocean Blvd	Mon
Existing	South Palm Beach	ISRD	ISRD Island Road	Mon
Existing	South Palm Beach	PBGC	PBGC Palm Beach GolfCourse	Tue
Existing	South Palm Beach	SOFS	SOFS South Fire Station	Thu

FIGURE 1

SHEET TITLE
TOWN OF PALM BE
DRINKING WATE
DISTRIBUTION SYS
SAMPLING SITES
WEST PALM BEA
SAMPLING SCHED

DESIGNED	**JOB NO.:** 803031900
DRAWN K. GRECO	**DATE:** 10/07/2008
CHECKED	**CAD NO.:**

HSA
ENGINEERS & SCIENTISTS

TOWN OF PALM BEACH PUBLIC WORKS
951 OLD OKEECHOBEE ROAD
WEST PALM BEACH, FLORIDA

From: Kirk Blouin
To: John Page
Cc: Police Code Enforcement
Subject: Re: ARCOM
Date: Thursday, June 26, 2008 2:09:06 PM

JP,

Here is a copy of the minutes from the April CEB hearing. Each month thereafter the case was postponed because we were aware that it was being brought to ARCOM. Now that this matter has been resolved with ARCOM we will proceed with a code enforcement case until the property is in compliance (meaning they plant the shrubbery and hedges approved by the Town).

Sgt. Krauel or Rob Walton will be available on July 23rd as I will be attending a conference.

H. Case # 08-2484, 515 N. County Road, Trump Properties, LLC

Violation of Chapter 18, Section 18-205 of the Town of Palm Beach Code of Ordinances, the Architectural Commission may attach conditions to any approval it grants (Declaration of Use Agreement).

Lead Code Enforcement Walton presented the facts of the case and said the previous owner of the property, Abe Gosman, had been granted approval by the Architectural Commission to do some remodeling. One of the conditions of this approval was that the hedge along the front of the property be maintained in the condition it was in at the time the approval was granted. This agreement was a binding agreement, which passes on to any subsequent property owner. The agreement was made January 31, 1990. The subsequent buyer of this property was Mr. Trump, Trump Properties, LLC and some remodeling work was done, removing the previous hedge. A new hedge was planted to replace the original hedge and that one has now been removed. This is a violation of the agreement. A letter was received from Mr. Royce, representing Mr. Trump, asking for a postponement of today's hearing. The Town does not feel this matter should be postponed.

Mr. Randolph summarized the letter from Mr. Royce which indicated the ficus hedge keeps dying and they want to replace it with something different. They plan on hiring a landscape architect to go before the next Architectural Commission meeting to get approval to install a hedge in an attempt to meet the conditions of the declaration of use agreement. Mr. Randolph said he had discussions with Mr. Royce and Mr. Walton and Mr. Royce was told the Town could not recommend a postponement and the recommendation would be that they are found in violation, assessed the $150.00 in administrative costs and be given until June 18th, which is the day before the June Code Enforcement Board meeting, to comply. This would give them the opportunity to appear before the Architectural Commission to see if they can get approval to re-plant a hedge. The hedge has to be installed to the height which existed at the time of the agreement which Mr. Randolph said he believed was twenty-two (22) feet. Mr. Randolph said Mr. Royce was not present today because he had a planned vacation.

MOTION BY MR. FRIED TO FIND THE VIOLATOR IN NON-COMPLIANCE, ASSESS ADMINISTRATIVE COSTS OF $150.00 AND GIVE THEM UNTIL JUNE 18, 2008 TO COMPLY.

SECONDED BY MS. VAN BUREN

MOTION PASSED UNANIMOUSLY

From: John Page/PalmBeach
To: Kirk Blouin/PalmBeach@PalmBeach
Cc: Tim Frank/PalmBeach@PalmBeach
Date: 06/26/2008 09:00 AM
Subject: ARCOM

Kirk: We had our June monthly ARCOM meeting yesterday. You likely know that ARCOM is working with Mr. Trump to re-install a hedge on his North County Road property. I believe this case is now pending in front of Code Enforcement. In May, ARCOM approved a plan to replace the former hedge with silver buttonwood shrubbery, which would additionally be back-planted with silver buttonwood trees....the overall effect would be an eventual 20' high screen. The shrubs have been planted, but yesterday attorney Ray Royce asked for postponing the trees until the end of the Hurricane season. ARCOM said NO and directed the attorney and landscaper to get the trees in ASAP. Also, more shrubbery was required at the main entry (north side) to match the newly installed hedge on the south side.

As the meeting was ending, the Commissioners asked for one of two things. They asked that either 1) a quick written report from Code Enforcement be made available to them at their next meeting on July 23 (9:00 a.m.) about the enforcement status of the case, or 2) that someone from Code Enforcement attend their meeting to provide a verbal status report. Their patience is wearing thin with the whole hedge issue, and it has them naturally curious about what is happening with their counterparts on Code Enforcement.

Would you or the appropriate representative from Code Enforcement be available on July 23? That would be my preference because follow-up questions almost always pop up. If not, can you provide me with a brief summary of your enforcement history and pending status? Thanks, JP

From: John Page
To: [redacted]
Subject: Re: Russian House
Date: Monday, May 04, 2009 5:23:18 PM

Mayor:

Happy to help. The address is 515 N. County Road.

JP

From: [redacted]
To: [redacted]
Date: 05/04/2009 04:28 PM
Subject: Russian House

JP: What is the address of the former Trump mansion on North Ocean purchased by the Russian?

MM

Remember Mom this Mother's Day! Find a florist near you now.

From: John Page
To: [redacted]
Subject: Re: Trump house
Date: Wednesday, November 19, 2008 7:54:32 AM

[redacted]

Mayor: The address you want is: 515 North County Road. (NOT North Ocean Blvd.) JP

From: [redacted]
To: [redacted]
Date: 11/19/2008 07:43 AM
Subject: Trump house

JP: Can you provide the # address for the old Gosman/Trump house on North Ocean Boulevard?

MM

Get the Moviefone Toolbar. Showtimes, theaters, movie news & more!

OGE Form 278e (March 2014)
U.S. Office of Government Ethics; 5 C.F.R. part 2634 | Form Approved: OMB No. (3209-0001)

Report Type:	Annual
Year (Annual Report only):	2018
Date of Appointment/Termination:	January 20, 2017

UNITED STATES OFFICE OF
GOVERNMENT ETHICS
★
Preventing Conflicts of Interest
in the Executive Branch

Executive Branch Personnel Public Financial Disclosure Report (OGE Form 278e)

Filer's Information

Last Name	First Name	MI	Position	Agency
Trump	Donald	J	President of the United States of America	

Other Federal Government Positions Held During the Preceding 12 Months:

N/A

Name of Congressional Committee Considering Nomination (Nominees only):

N/A

Filer's Certification - I certify that the statements I have made in this report are true, complete and correct to the best of my knowledge:

Signature:	Date: 5/15/19

Agency Ethics Official's Opinion – On the basis of information contained in this report, I conclude that the filer is in compliance with applicable laws and regulations (subject to any comments below)

Signature:	Date: 5/15/19

Other Review Conducted By:

Signature:	Date:

U.S. Office of Government Ethics Certification (if required):

Signature: Emory A Rounds	Date: 16 May 2019

Comments of Reviewing Officials:

OGE Form 278e (March 2014)

Instructions for Part 1

Note: This is a public form. Do not include account numbers, street addresses, or family member names. See instructions for required information.

Filer's Name	Page Number
Donald J. Trump	2 of 42

Part 1: Filer's Positions Held Outside United States Government

#	Organization Name	City/State	Organization Type	Position Held	From	To
1.	The Donald J. Trump Foundation, Inc. (inactive)	New York, NY	Non profit	Director/President	02.18.87/02.18.87	Present/11.13.2018
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Prior reports indicated that President Trump resigned the Director position on 1/19/17. However, the resignation did not take effect as the Foundation was in the process of dissolution. The position of President was inadvertently omitted on prior reports.

OGE Form 278e (March 2014)

Instructions for Part 2

Note: This is a public form. Do not include account numbers, street addresses, or family member names. See instructions for required information.

Filer's Name	Page Number
Donald J. Trump	3 of 42

Part 2: Filer's Employment Assets and Income

#	Description	EIF	attached schedule (Part 2 - EXHIBIT A) Reference #	Value	Income Type	Income Amount
002	40 Wall Street LLC Underlying Assets: commercial real estate Location: New York, NY See attached schedule	N/A	005	Over $50,000,000	rent	Over $5,000,000
004	401 North Wabash Venture LLC Underlying Assets: residential & commercial real estate Location: Chicago, IL See attached schedule	N/A	008	Over $50,000,000	rent condo sales	Over $5,000,000 $189,973
005	809 NORTH CANON LLC Underlying Assets: residential real estate Location: Beverly Hills, CA See attached schedule	N/A	009	$5,000,001 - $25,000,000		None (or less than $201)
007	845 UN Limited Partnership Underlying Assets: commercial real estate Location: New York, NY See attached schedule	N/A	012	$25,000,001 - $50,000,000	rent	$1,000,001 - $5,000,000
008	Caribusiness Investments, S.R.L. Underlying Assets: land (sold) Location: Dominican Republic See attached schedule	N/A	025	None (or less than $1,001)	land sales	$3,200,000
010	Country Apartments, LLC Value reported reflects bank account holding only. Additional Underlying Asset: none Entity set up to buy & sell residential real estate, New York, NY; See attached schedule	N/A	032	$1,001 - $15,000		None (or less than $201)
011	Country Properties, LLC Underlying Assets: residential real estate (sold) and residual receivables Location: Norfolk, VA See attached schedule	N/A	034	$15,001 - $50,000	sale	$146,875

THE ACCOMPANYING SCHEDULE (PART 2 - EXHIBIT A) IS AN INTEGRAL PART OF THE ABOVE AND SHOULD BE READ IN CONJUNCTION THEREWITH. Gaps in numerical sequence are due to the removal of previously reported items no longer reportable on this part. Information being reported from January 1, 2018 to December 31, 2018.

Filer's Name	Page Number
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Part 2: Filer's Employment Assets and Income

#	Description	EIF	attached schedule (Part 2 - EXHIBIT A) Reference #	Value	Income Type	Income Amount
012	D B Pace Acquisition, LLC Value reported reflects bank account holding only. Additional Underlying Assets: land, building and ff&e (sold) Location: New York, NY See attached schedule	N/A	036	None (or less than $1,001)	sale	$4,100,000
013	DJT AEROSPACE LLC Underlying Assets: aircraft Location: New York, NY See attached schedule	N/A	039	$1,000,001 - $5,000,000		None (or less than $201)
014	DJT HOLDINGS LLC Value reported reflects bank account only. Entity's other holdings and assets are reported elsewhere; see attached schedule. Holding company, New York, NY	N/A	042	$1,000,001 - $5,000,000	interest	$5,001 - $15,000
017	DJT OPERATIONS I LLC Underlying Assets: aircraft Location: New York, NY See attached schedule	N/A	046	Over $50,000,000	rent	$1,000,001 - $5,000,000
018	DT CONNECT II LLC Underlying Assets: aircraft Location: Palm Beach, FL See attached schedule	N/A	055	$1,000,001 - $5,000,000	rent	$15,001 - $50,000
020	DT DUBAI GOLF MANAGER LLC Value reported reflects bank account holding only. Additional Underlying Asset: management deal with DAMAC CRESCENT PROPERTIES LLC - value not readily ascertainable. Management company, Dubai, UAE; See attached schedule.	N/A	059	$15,001 - $50,000	management fees	$314,580
021	DT HOME MARKS INTERNATIONAL LLC Value reported reflects bank account holding only. Additional Underlying Asset: license deal with RNA RESOURCES GROUP LTD, DORYA INTERNATIONAL LLC, HOMESTUDIO INTERNATIONAL SA, WONU CO LTD - value not readily ascertainable. License holder, New York, NY; See attached schedule.	N/A	063	$1,001 - $15,000	royalties	$50,001 - $100,000

THE ACCOMPANYING SCHEDULE (PART 2 - EXHIBIT A) IS AN INTEGRAL PART OF THE ABOVE AND SHOULD BE READ IN CONJUNCTION THEREWITH. Gaps in numerical sequence are due to the removal of previously reported items no longer reportable on this part. Information being reported from January 1, 2018 to December 31, 2018.

Filer's Name	Page Number
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Part 2: Filer's Employment Assets and Income

#	Description	EIF	attached schedule (Part 2 - EXHIBIT A) Reference #	Value	Income Type	Income Amount
024	Excel Venture I LLC Underlying Assets: residential rental property Location: St. Martin, French West Indies See attached schedule	N/A	098	$5,000,001 - $25,000,000		None (or less than $201)
026	Fifty-Seventh Street Associates LLC Underlying Assets: commercial real estate Location: New York, NY See attached schedule	N/A	100	Over $50,000,000	rent	Over $5,000,000
028	Golf Productions LLC Value reported reflects bank account holding only. Entity promotes golf business, New York, NY; See attached schedule Value not readily ascertainable.	N/A	105	None (or less than $1,001)	golf related revenue	$870,000
030	TRUMP NATIONAL GOLF CLUB - JUPITER Underlying Assets: golf club Location: Jupiter, FL See attached schedule	N/A	117	Over $50,000,000	golf related revenue	$13,131,919
031	LAMINGTON FAMILY HOLDINGS LLC Underlying Assets: land Location: Bedminster, NJ See attached schedule	N/A	119	$100,001 - $250,000		None (or less than $201)
032	TRUMP NATIONAL GOLF CLUB - BEDMINSTER Underlying Assets: golf club Location: Bedminster, NJ See attached schedule	N/A	120	Over $50,000,000	golf related revenue	$15,728,572
034	MAR-A-LAGO CLUB, L.L.C. Underlying Assets: resort Location: Palm Beach, FL See attached schedule	N/A	126	Over $50,000,000	resort related revenue	$22,692,146
036	PINE HILL DEVELOPMENT LLC Underlying Assets: golf club Location: Pine Hill, NJ See attached schedule	N/A	142	$100,001 - $250,000		None (or less than $201)
037	Seven Springs LLC Underlying Assets: real estate Location: Mt. Kisco, NY See attached schedule	N/A	153	$25,000,001 - $50,000,000		None (or less than $201)
038	TRUMP TURNBERRY Underlying Assets: golf courses and resort Location: Turnberry, Scotland See attached schedule	N/A	157	Over $50,000,000	golf related revenue	$23,446,634
039	T International Realty LLC Value reported reflects bank account holding only. Additional Underlying Asset: brokerage company - value not readily ascertainable. Brokerage company, New York, NY; See attached schedule	N/A	160	$1,001 - $15,000	commissions	$1,624,575

THE ACCOMPANYING SCHEDULE (PART 2 - EXHIBIT A) IS AN INTEGRAL PART OF THE ABOVE AND SHOULD BE READ IN CONJUNCTION THEREWITH. Gaps in numerical sequence are due to the removal of previously reported items no longer reportable on this part. Information being reported from January 1, 2018 to December 31, 2018.

Filer's Name	Page Number
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Part 2: Filer's Employment Assets and Income

#	Description	EIF	attached schedule (Part 2 - EXHIBIT A) Reference #	Value	Income Type	Income Amount
040	THC CENTRAL RESERVATIONS LLC Value reported reflects bank account holding only. Additional Underlying Asset: hotel company - value not readily ascertainable. Hotel company, New York, NY; see attached schedule	N/A	167	$500,001 - $1,000,000		None (or less than $201)
041	THC CHINA DEVELOPMENT LLC Value reported reflects bank account holding only. Additional Underlying Asset: developer - value not readily ascertainable. Developer, New York, NY; See attached schedule	N/A	169	$1,001 - $15,000		None (or less than $201)
042	THC SALES & MARKETING LLC Value reported reflects bank account holding only. Additional Underlying Asset: management company - value not readily ascertainable. Management company, New York, NY; See attached schedule	N/A	184	$250,001 - $500,000		None (or less than $201)
043	The East 61 Street Company, LP Underlying Assets: residential real estate Location: New York, NY See attached schedule	N/A	199	$5,000,001 - $25,000,000	rent	$15,001 - $50,000
044	THE TRUMP CORPORATION Underlying Assets: management company Location: New York, NY See attached schedule	N/A	200	Over $50,000,000	management and related fees	$14,835,168
045	The Trump-Equitable Fifth Avenue Company Value reported reflects bank account only. Entity's other holdings and assets are reported elsewhere; see attached schedule. Pass-thru entity, New York, NY	N/A	208	None (or less than $1,001)	rent	$100,001 - $1,000,000
046	TRUMP INTERNATIONAL GOLF LINKS - DOONBEG Underlying Assets: golf course and resort Location: Doonbeg, Ireland See attached schedule	N/A	211	$25,000,001 - $50,000,000	golf related revenue	$14,498,625
047	TIHT COMMERCIAL LLC Underlying Assets: commercial real estate Location: New York, NY See attached schedule	N/A	218	$5,000,001 - $25,000,000	rent	$1,000,001 - $5,000,000
048	TIHT HOLDING COMPANY LLC Underlying Assets: hotel condo unit Location: New York, NY See at	N/A	219	$1,000,001 - $5,000,000	rent	$50,001 - $100,000

THE ACCOMPANYING SCHEDULE (PART 2 - EXHIBIT A) IS AN INTEGRAL PART OF THE ABOVE AND SHOULD BE READ IN CONJUNCTION THEREWITH. Gaps in numerical sequence are due to the removal of previously reported items no longer reportable on this part. Information being reported from January 1, 2018 to December 31, 2018.

Filer's Name	Page Number
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Part 2: Filer's Employment Assets and Income

#	Description	EIF	attached schedule (Part 2 - EXHIBIT A) Reference #	Value	Income Type	Income Amount	
049	TRUMP NATIONAL GOLF CLUB - CHARLOTTE Underlying Assets: golf club Location: Charlotte, NC See attached schedule	N/A	223	$5,000,001 - $25,000,000	golf related revenue		$12,457,295
050	TRUMP NATIONAL GOLF CLUB - HUDSON VALLEY Underlying Assets: golf club Location: Hopewell Junction, NY See attached schedule	N/A	225	$5,000,001 - $25,000,000	golf related revenue		$4,243,331
051	TRUMP NATIONAL GOLF CLUB - PHILADELPHIA Underlying Assets: golf club Location: Pine Hill, NJ See attached schedule	N/A	229	$5,000,001 - $25,000,000	golf related revenue		$4,089,471
052	TRUMP 106 CPS LLC Value reported reflects bank account holding only. Additional Underlying Asset: none Location: New York, NY; See attached schedule	N/A	234	$15,001 - $50,000		None (or less than $201)	
057	TRUMP BOOKS LLC THE MIDAS TOUCH Value reported reflects bank account holding only. Additional Underlying Asset: book deal with Plata Publishing LLC - value not readily ascertainable. Holder of book contract, New York, NY, See attached schedule (Published 2011)	N/A	243	None (or less than $1,001)	royalties	$5,001 - $15,000	
059	TRUMP CAROUSEL LLC Value reported reflects bank account holding only. Additional Underlying Asset: operating agreement with NEW YORK CITY DEPARTMENT OF PARKS & RECREATION - value not readily ascertainable. Carousel operator, New York, NY. See attached schedule	N/A	250	$15,001 - $50,000	admissions		$465,186
061	TRUMP CPS LLC Underlying Assets: commercial and residential real estate Location: New York, NY See attached schedule	N/A	269	$25,000,001 - $50,000,000	rent	$1,000,001 - $5,000,000	
064	TRUMP NATIONAL DORAL Underlying Assets: golf courses & resort Location: Miami, FL See attached schedule	N/A	279	Over $50,000,000	golf resort related revenues		$75,962,848
065	TRUMP FERRY POINT LLC Underlying Assets: operating agreement with NEW YORK CITY DEPARTMENT OF PARKS & RECREATION - golf course Location: New York, NY See attached schedule (Opening Day: April 1, 2015)	N/A	283	$5,000,001 - $25,000,000	golf related revenue		$6,469,831

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Part 2: Filer's Employment Assets and Income

#	Description	EIF	attached schedule (Part 2 - EXHIBIT A) Reference #	Value	Income Type	Income Amount
066	TRUMP GOLF ACQUISITIONS LLC Value reported reflects bank account holding only. Additional Underlying Asset: none Entity set up to sign letters of intent for golf related deals, New York, NY; See attached schedule	N/A	287	$1,001 - $15,000	golf related revenue	$7,057
067	TRUMP HOME MARKS LLC Value reported reflects bank account holding only. Additional Underlying Asset: license deal with DOWNLITE INTERNATIONAL INC, GOURMET HOME PRODUCTS LLC, NORTHPOINT TRADING LLC, SIGN OF TIMES INC, TPS SAS - value not readily ascertainable. License holder, New York, NY See attached schedule	N/A	291	$1,001 - $15,000		None (or less than $201)
068	TRUMP ICE LLC Value reported reflects bank account holding only. Additional Underlying Asset: wholesale company - value not readily ascertainable. Water wholesaler, New York, NY; See attached schedule	N/A	294	$1,001 - $15,000	sales	$222,053
069	TRUMP INTERNATIONAL GOLF LINKS - SCOTLAND Underlying Assets: golf course Location: Aberdeen, Scotland See attached schedule	N/A	297	Over $50,000,000	golf related revenue	$3,543,487
070	TRUMP INTERNATIONAL GOLF CLUB - FLORIDA Underlying Assets: golf club Location: West Palm Beach, FL See attached schedule	N/A	299	$25,000,001 - $50,000,000	golf related revenue	$12,325,355
071	TRUMP INTERNATIONAL HOTEL HAWAII LLC Value reported reflects bank account holding only. Additional Underlying Asset: management and license agreements with IRONGATE AZREP BW LLC - value not readily ascertainable. License holder, Waikiki, HI See attached schedule	N/A	300	None (or less than $1,001)	royalties management fees	$100,001 - $1,000,000 $1,785,996
072	TRUMP INTERNATIONAL HOTELS MANAGEMENT LLC Underlying Assets: management company Location: New York, NY See attached schedule	N/A	301	Over $50,000,000	management fees	$1,511,377
073	TRUMP LAS VEGAS DEVELOPMENT LLC Value reported reflects bank account holding only. Additional Underlying Assets: development deal with TRUMP RUFFIN TOWER I LLC - value not readily ascertainable. Entity set up to receive development fees, Las Vegas, NV See attached schedule	N/A	308	$1,001 - $15,000	development fees	$3,308,936
076	TRUMP MARKS ASIA LLC Underlying Assets: residential real estate Location: Sterling, VA See attached schedule	N/A	316	$500,001 - $1,000,000		None (or less than $201)

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#	Description	EIF	attached schedule (Part 2 - EXHIBIT A) Reference #	Value	Income Type	Income Amount
078	TRUMP MARKS ISTANBUL II LLC Value reported reflects bank account holding only. Additional Underlying Asset: license deal with ORTADOGU OTOMOTIV TICARET AS - value not readily ascertainable. License holder, New York, NY See attached schedule	N/A	342	None (or less than $1,001)	royalties	$100,001 - $1,000,000
080	TRUMP MARKS MATTRESS LLC Value reported reflects bank account holding only. Additional Underlying Asset: license deal with SERTA - value not readily ascertainable. License holder, New York, NY See attached schedule	N/A	350	None (or less than $1,001)	royalties	$5,001 - $15,000
081	TRUMP MARKS MENSWEAR LLC Value reported reflects bank account holding only. Additional Underlying Asset: license deal with PVH CORP, PEERLESS CLOTHING INTERNATIONAL, PARLUX LTD, OXFORD OPTHALMIC, RANDA ACCESSORIES - value not readily ascertainable. License holder, New York, NY See attached schedule	N/A	352	$1,001 - $15,000	royalties	$15,001 - $50,000
087	TRUMP MARKS WAIKIKI LLC Value reported reflects bank account holding only. Additional Underlying Asset: license deal with IRONGATE AZREP BW LLC - value not readily ascertainable. License holder, New York, NY See attached schedule	N/A	391	None (or less than $1,001)	royalties	$100,001 - $1,000,000
090	TRUMP MIAMI RESORT MANAGEMENT LLC Value reported reflects bank account holding only. Management company - value not readily ascertainable, Miami, FL; See attached schedule	N/A	396	$1,000,001 - $5,000,000		None (or less than $201)
091	TRUMP MODEL MANAGEMENT LLC Value reported reflects bank account holding only. Modeling agency (business winding down) Location: New York, NY See attached schedule	N/A	398	$50,001 - $100,000	residual income	$547
092	TRUMP NATIONAL GOLF CLUB - COLTS NECK Underlying Assets: golf club Location: Colts Neck, NJ See attached schedule	N/A	399	Over $50,000,000	golf related revenue	$6,775,959
093	TRUMP NATIONAL GOLF CLUB - WESTCHESTER Underlying Assets: golf club Location: Briarcliff Manor, NY See attached schedule	N/A	401	Over $50,000,000	golf related revenue	$7,213,358
094	TRUMP NATIONAL GOLF CLUB - WASHINGTON DC Underlying Assets: golf club Location: Potomac Falls, VA See attached schedule	N/A	403	Over $50,000,000	golf related revenue	$13,318,369

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#	Description	EIF	attached schedule (Part 2 - EXHIBIT A) Reference #	Value	Income Type	Income Amount
095	TRUMP OLD POST OFFICE LLC Underlying Assets: hotel Location: Washington, DC See attached schedule	N/A	408	Over $50,000,000	hotel related revenue	$40,842,294
097	Miss Universe L.P., LLLP Value reported reflects bank account holding only. Additional Underlying Asset: none See attached schedule	N/A	413	$50,001 - $100,000		None (or less than $201)
098	TRUMP PALACE/PARC LLC Underlying Assets: commercial real estate Location: New York, NY See attached schedule	N/A	414	$5,000,001 - $25,000,000	rent	$100,001 - $1,000,000
099	TRUMP PARK AVENUE LLC Underlying Assets: residential & commercial real estate Location: New York, NY See attached schedule	N/A	420	Over $50,000,000	rent	$1,000,001 - $5,000,000
100	TRUMP PLAZA LLC Underlying Assets: residential & commercial real estate Location: New York, NY See attached schedule	N/A	424	$25,000,001 - $50,000,000	rent	$1,000,001 - $5,000,000
101	TRUMP PRODUCTIONS LLC Value reported reflects bank account holding only. Additional Underlying Assets: production company - value not readily ascertainable. Location: New York, NY See attached schedule	N/A	426	None (or less than $1,001)	production revenue	$279,868
103	Trump Restaurants LLC Underlying Assets: restaurant/retail Location: New York, NY See attached schedule	N/A	430	$1,000,001 - $5,000,000	food & beverage and related merchandise sales	$4,364,103
104	TRUMP RUFFIN TOWER I LLC Underlying Assets: commercial real estate Location: Las Vegas, NV See attached schedule	N/A	434	Over $50,000,000	condo sales hotel related revenue	$6,002,244 $22,556,054
106	TRUMP SCOTSBOROUGH SQUARE LLC Underlying Assets: residential real estate Location: Scotsborough Square, VA See attached schedule	N/A	438	$500,001 - $1,000,000	rent	$5,001 - $15,000
108	TRUMP TOWER COMMERCIAL LLC Underlying Assets: commercial real estate Location: New York, NY See attached schedule	N/A	444	Over $50,000,000	rent	Over $5,000,000

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#	Description	EIF	attached schedule (Part 2 - EXHIBIT A) Reference #	Value	Income Type	Income Amount
109	TRUMP TOWER MANAGING MEMBER INC. Value reported reflects bank account holding only. Entity's other holdings and assets are reported elsewhere; see attached schedule. Pass-thru entity. New York, NY	N/A	445	$1,001 - $15,000		None (or less than $201)
110	TRUMP VINEYARD ESTATES LLC Underlying Assets: vineyard Location: Charlottesville, VA See attached schedule	N/A	447	$5,000,001 - $25,000,000	rent	$100,001 - $1,000,000
111	TRUMP VINEYARD ESTATES LOT 3 OWNER LLC Underlying Assets: vineyard Location: Charlottesville, VA See attached schedule	N/A	448	$500,001 - $1,000,000	rent	$100,001 - $1,000,000
112	TRUMP VIRGINIA ACQUISITIONS LLC Underlying Assets: commercial real estate Location: Charlottesville, VA See attached schedule	N/A	450	$5,000,001 - $25,000,000	hotel related revenue	$1,140,943
113	TRUMP VIRGINIA LOT 5 LLC Underlying Assets: vineyard Location: Charlottesville, VA See attached schedule	N/A	452	$500,001 - $1,000,000	rent	$15,001 - $50,000
114	TW VENTURE II LLC Value reported reflects bank account holding only. Entity's other holdings and assets are reported elsewhere; see attached schedule. Pass-thru entity. Doonbeg, Ireland	N/A	464	$1,001 - $15,000		None (or less than $201)
116	TRUMP NATIONAL GOLF CLUB - LOS ANGELES Underlying Assets: golf course and unsold lots Location: Los Angeles, CA See attached schedule	N/A	469	Over $50,000,000	golf related revenue land sales	$10,913,069 $7,010,000
119	Wollman Rink Operations LLC Underlying Assets: operating agreement with NEW YORK CITY DEPARTMENT OF PARKS & RECREATION - ice skating rinks Location: New York, NY See attached schedule	N/A	476	$1,000,001 - $5,000,000	ice skating rink operation	$8,493,215
120	HWA 555 Owners, LLC Underlying Assets: commercial real estate Location: San Francisco, CA See attached schedule	N/A	478	Over $50,000,000	rent	Over $5,000,000
121	1290 AVENUE OF THE AMERICAS, A TENANCY-IN-COMMON Underlying Assets: commercial real estate Location: New York, NY See attached schedule	N/A	479	Over $50,000,000	rent	Over $5,000,000

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#	Description	EIF	attached schedule (Part 2 - EXHIBIT A) Reference #	Value	Income Type	Income Amount
122	4% limited partnership interest in Starrett City Associates, L.P. (via the entities disclosed on Exhibit A and direct ownership by The Donald J. Trump Revocable Trust) Value of remaining distributions not readily ascertainable Additional Underlying Assets: residential real estate (sold) Location: Brooklyn, NY	N/A	018, 141, 154, 446		rent distributable share including sales proceeds	$1,000,001 - $5,000,000 $13,355,178
123	4% limited partnership interest in Spring Creek Plaza LLC (via the entities disclosed on Exhibit A and direct ownership by The Donald J. Trump Revocable Trust) Value of remaining distributions not readily ascertainable Additional Underlying Assets: commercial real estate (sold) Location: Brooklyn, NY	N/A	018, 141, 154, 446		rent distributable share including sales proceeds	$15,001 - $50,000 $1,099,840
124	Trump Tower Triplex Underlying Assets: residential real estate Location: New York, NY	N/A		Over $50,000,000		None (or less than $201)
125	N/K/A DT VENTURE I LLC Underlying Assets: residential real estate Location: Palm Beach, FL See attached schedule	N/A	533	$5,000,001 - $25,000,000	rent	$100,001 - $1,000,000
126	N/K/A DTW VENTURE LLC Underlying Assets: residential real estate Location: Palm Beach, FL See attached schedule	N/A	093	$1,000,001 - $5,000,000	rent	$100,001 - $1,000,000

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#	Description	EIF	attached schedule (Part 2 - EXHIBIT A) Reference #	Value	Income Type	Income Amount
127	DT Marks Worli LLC Underlying Assets: license deal Licensee(s): JAWALA REAL ESTATE PRIVATE LTD, LODHA DEVELOPERS PRIVATE LTD Location: New York, NY See attached schedule Value not readily ascertainable	N/A	089		royalties	$100,001 - $1,000,000
130	THC VANCOUVER MANAGEMENT CORP Underlying Assets: management company Location: Vancouver, Canada See attached schedule Value not readily ascertainable	N/A	190		management fees	$213,946
132	TNGC JUPITER MANAGEMENT LLC Value reported reflects bank account holding only. Additional Underlying Asset: management company Location: Jupiter, FL See attached schedule Value not readily ascertainable	N/A	227	$15,001 - $50,000	management fees	$375,552
133	TRUMP CHICAGO COMMERCIAL MANAGER LLC Underlying Assets: management company Location: New York, NY See attached schedule Value not readily ascertainable	N/A	254		management fees	$142,830
134	TRUMP CHICAGO HOTEL MANAGER LLC Value reported reflects bank account holding only. Underlying Asset: management company Location: New York, NY See attached schedule Value not readily ascertainable	N/A	256	None (or less than $1,001)	management fees	$1,702,003
135	TRUMP CHICAGO RESIDENTIAL MANAGER LLC Underlying Assets: management company Location: New York, NY See attached schedule Value not readily ascertainable	N/A	260		management fees	$524,819
136	TRUMP MARKS FINE FOODS LLC Value reported reflects bank account holding only. Additional Underlying Asset: license deal with TWO RIVERS COFFEE - value not readily ascertainable. License holder, New York, NY See attached schedule	N/A	333	None (or less than $1,001)	royalties	$5,001 - $15,000

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#	Description	EIF	attached schedule (Part 2 - EXHIBIT A) Reference #	Value	Income Type	Income Amount
137	TRUMP MARKS PHILIPPINES LLC Value reported reflects bank account holding only. Licensee(s): CENTURY CITY DEVELOPMENT CORP Location: New York, NY See attached schedule Value not readily ascertainable	N/A	367	None (or less than $1,001)	royalties	$1,000,001 - $5,000,000
140	TRUMP MARKS SUNNY ISLES I LLC Value reported reflects bank account holding only. Additional Underlying Assets: license deal - value not readily ascertainable. Licensee(s): MICHAEL DEZER & NAOMI DEZERTOV Location: New York, NY See attached schedule	N/A	381	$1,001 - $15,000	royalties	$100,001 - $1,000,000
141	TRUMP PANAMA HOTEL MANAGEMENT LLC Value reported reflects bank account holding only Underlying Assets: management agreement Location: New York, NY See attached schedule Value not readily ascertainable	N/A	417	None (or less than $1,001)	management fees	$3,016
142	TRUMP TORONTO HOTEL MANAGEMENT CORP Value reported reflects bank account holding only. Additional Underlying Asset: management deal with TALON INTERNATIONAL INC - value not readily ascertainable. Management company, New York, NY; See attached schedule.	N/A	442	$1,001 - $15,000		None (or less than $201)
143	TW VENTURE I LLC Value reported reflects bank account holding only. Additional Underlying Asset: transportation services company - value not readily ascertainable. Palm Beach, FL See attached schedule	N/A	462	$15,001 - $50,000	operating income	$99,093
144	Trump Management Inc. Value reported reflects bank account holding only. Additional Underlying Asset: management company - value not readily ascertainable Location: Manhasset, NY See attached schedule	N/A	480	$15,001 - $50,000		None (or less than $201)
146	Think Like A Champion Publisher: Vanguard Press, a member of Perseus Books LLC Underlying Assets: book Location: New York, NY Value not readily ascertainable (Published 2009)	N/A			royalties	$2,501 - $5,000

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#	Description	EIF	attached schedule (Part 2 - EXHIBIT A) Reference #	Value	Income Type	Income Amount
147	The Art Of The Deal Publisher: Random House Underlying Assets: book Location: New York, NY Value not readily ascertainable (Published 1987)	N/A			royalties	$100,001 - $1,000,000
148	Time To Get Tough Publisher: Regnery Publishing Underlying Assets: book Location: New York, NY Value not readily ascertainable (Published 2011)	N/A			royalties	$15,001 - $50,000
149	Think Like a Billionaire Publisher: Random House Underlying Assets: book Location: New York, NY Value not readily ascertainable (Published 2004)	N/A				None (or less than $201)
150	The Art of the Comeback Publisher: Random House Underlying Assets: book Location: New York, NY Value not readily ascertainable (Published 1997)	N/A				None (or less than $201)
151	Why We Want You To Be Rich Publisher: Plata Publishing LLC Underlying Assets: book Location: New York, NY Value not readily ascertainable (Published 2006)	N/A				None (or less than $201)
152	Trump 101: The Way to Success Publisher: John Wiley & Sons, Inc. Underlying Assets: book Location: New York, NY Value not readily ascertainable (Published 2007)	N/A				None (or less than $201)
153	The America We Deserve Publisher: Renaissance Books Underlying Assets: book Location: New York, NY Value not readily ascertainable (Published 2000)	N/A				None (or less than $201)
154	Never Give Up Publisher: John Wiley & Sons, Inc. Underlying Assets: book Location: New York, NY Value not readily ascertainable (Published 2008)	N/A				None (or less than $201)

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#	Description	EIF	attached schedule (Part 2 - EXHIBIT A) Reference #	Value	Income Type	Income Amount
155	The Best Real Estate Advice I Ever Received Publisher: Thomas Nelson, Inc. Underlying Assets: book Location: New York, NY Value not readily ascertainable (Published 2005)	N/A				None (or less than $201)
156	The Way To The Top Publisher: Bill Adler Books Underlying Assets: book Location: New York, NY Value not readily ascertainable (Published 2004)	N/A			royalties	$2,501 - $5,000
157	How to Get Rich Publisher: Random House Underlying Assets: book Location: New York, NY Value not readily ascertainable (Published 2004)	N/A			royalties	$15,001 - $50,000
158	Think Big and Kick Ass Publisher: HarperCollins Publishers Underlying Assets: book Location: New York, NY Value not readily ascertainable (Published 2007)	N/A				None (or less than $201)
159	Trump: Surviving At The Top Publisher: Random House Underlying Assets: book Location: New York, NY Value not readily ascertainable (Published 1990)	N/A				None (or less than $201)
160	SCREEN ACTORS GUILD PENSION Underlying Assets: pension Location: Burbank, CA Value not readily ascertainable	N/A			pension	$90,776
169	THC MIAMI RESTAURANT HOSPITALITY LLC Value reported reflects bank account holding only. Restaurant operations at Trump National Doral Location: Miami, FL	N/A	178	$50,001 - $100,000	food & beverage related sales	$5,454,345
178	THC IMEA DEVELOPMENT LLC Value reported reflects bank account holding only. Additional Underlying Asset: developer - value not readily ascertainable. Location: New York, NY See attached schedule.	N/A	177	$1,001 - $15,000		None (or less than $201)

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#	Description	EIF	attached schedule (Part 2 - EXHIBIT A) Reference #	Value	Income Type	Income Amount
180	TRUMP MARKS PUNTA DEL ESTE LLC Value reported reflects bank account holding only. Additional Underlying Asset: license deal with AETOS SA and FAROY SA - value not readily ascertainable. License holder, Punta Del Este, Uruguay; See attached schedule.	N/A	374	None (or less than $1,001)	royalties	$100,001 - $1,000,000
181	DT BALI TECHNICAL SERVICES MANAGER LLC Value reported reflects bank account holding only. Additional Underlying Asset: management deal with PT BALI NIRWANA RESORT - value not readily ascertainable. Management company, Bali, Indonesia; See attached schedule.	N/A	497	None (or less than $1,001)	management fees	$110,713
182	DT CONNECT EUROPE LIMITED Value reported reflects bank account holding only. Additional Underlying Assets: aircraft (transferred) Location: Turnberry, Scotland See attached schedule	N/A	499	$1,001 - $15,000	rent	$50,001 - $100,000
183	DT ENDEAVOR I LLC Underlying Assets: aircraft Location: Palm Beach, FL See attached schedule	N/A	500	$5,000,001 - $25,000,000		None (or less than $201)
184	DT LIDO TECHNICAL SERVICES MANAGER LLC Value reported reflects bank account holding only. Additional Underlying Asset: management deal with PT LIDO NIRWANA PARAHYANGAN - value not readily ascertainable. Management company, Lido, Indonesia; See attached schedule.	N/A	509	$1,001 - $15,000	management fees	$101,487
187	MOBILE PAYROLL CONSTRUCTION LLC Value reported reflects bank account holding only. Additional Underlying Asset: none Payroll company, Bedminster, NJ; See attached schedule	N/A	523	$50,001 - $100,000		None (or less than $201)
188	CRIPPLED AMERICA Publisher: Threshold Editions Underlying Assets: book Location: New York, NY Value not readily ascertainable (Published 2015)	N/A				None (or less than $201)
189	DTTM OPERATIONS LLC Value reported reflects bank account holding only. Entity's other holdings and assets are reported elsewhere; see attached schedule. Pass-thru entity. New York, NY	N/A	519	$1,001 - $15,000		None (or less than $201)

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#	Description	EIF	attached schedule (Part 2 - EXHIBIT A) Reference #	Value	Income Type	Income Amount
191	Trump Las Vegas Sales & Marketing, Inc. Value reported reflects bank account holding only. Additional Underlying Assets: sales & marketing deal with TRUMP RUFFIN TOWER I LLC - value not readily ascertainable. Entity set up to receive brokerage commissions, Las Vegas, NV; See attached schedule	N/A	311	$1,001 - $15,000	commissions	$162,439
192	DT TOWER KOLKATA LLC Value reported reflects bank account holding only. Additional Underlying Asset: license deal with CONCAST INFRASTRUCTURE PRIVATE LIMITED, TRIBECA CREATORS LLP, REGENT HIRISE PRIVATE LIMITED, RAJ CONSTRUCTION PROJECTS PRIVATE LIMITED, RDB REALTY & INFRASTRUCTURE LIMITED - value not readily ascertainable. License holder, Kolkata, India; See attached schedule.	N/A	517	$1,001 - $15,000	royalties	$100,001 - $1,000,000
194	STORAGE 106 LLC Underlying Assets: commercial real estate (asset transferred in 2018) Location: New York, NY See attached schedule	N/A	542	None (or less than $1,001)	rent	$50,001 - $100,000
195	SC CLEVELAND MS MANAGEMENT LLC Value reported reflects bank account holding only. Additional Underlying Asset: management deal with CHAWLA POINTE, LLC Management company, Cleveland, MS; See attached schedule Value not readily ascertainable	N/A	545	None (or less than $1,001)	management fees	$10,303
196	T RETAIL LLC Underlying Asset: online retail business Location: New York, NY See attached schedule	N/A	548	$250,001 - $500,000	sales	$520,305
197	WESTMINSTER HOTEL MANAGEMENT LLC Value reported reflects bank account holding only. Additional Underlying Asset: management deal with ESPLANADE LIVINGSTON, LLC Management company, Livingston, NJ; See attached schedule Value not readily ascertainable	N/A	550	None (or less than $1,001)	management fees	$142,415

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#	Description	EIF	attached schedule (Part 2 - EXHIBIT A) Reference #	Value	Income Type	Income Amount
198	AMERICAN FEDERATION of TELEVISION and RADIO ARTISTS PENSION Underlying Assets: pension Location: New York, NY Value not readily ascertainable	N/A			pension	$8,724
199	WB Studio Enterprises Inc Residual income earned from movies/television Individual programs generated less than $200 of income Location: Burbank, CA Value not readily ascertainable	N/A			royalties	$201 - $1,000
200	Universal City Studios LLC Residual income earned from movies/television The Little Rascals All others generated less than $200 of income Location: New York, NY Value not readily ascertainable	N/A			royalties	$201 - $1,000
201	Entertainment Partners Residual income earned from movies/television Location: Burbank, CA Value not readily ascertainable	N/A				None (or less than $201)
202	GOLF RECREATION SCOTLAND LIMITED Value reported reflects bank account holding only. Entity's other holdings and assets are reported elsewhere; see attached schedule. Pass-thru entity. Turnberry, Scotland	N/A	107	$1,001 - $15,000		None (or less than $201)
203	TRUMP DEVELOPMENT SERVICES LLC Value reported reflects bank account holding only. Additional Underlying Asset: management company - value not readily ascertainable. Location: New York, NY See attached schedule	N/A	271	None (or less than $1,001)	management fees	$848,604
204	TURNBERRY SCOTLAND LLC Value reported reflects bank account holding only. Entity's other holdings and assets are reported elsewhere; see attached schedule. Pass-thru entity. Turnberry, Scotland	N/A	460	$1,001 - $15,000		None (or less than $201)

THE ACCOMPANYING SCHEDULE (PART 2 - EXHIBIT A) IS AN INTEGRAL PART OF THE ABOVE AND SHOULD BE READ IN CONJUNCTION THEREWITH. Gaps in numerical sequence are due to the removal of previously reported items no longer reportable on this part. Information being reported from January 1, 2018 to December 31, 2018.

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Part 2: Filer's Employment Assets and Income

#	Description	EIF	attached schedule (Part 2 - EXHIBIT A) Reference #	Value	Income Type	Income Amount
205	4T HOLDINGS TWO LLC Value reported reflects bank account holding only. Additional Underlying Asset: management company - value not readily ascertainable. Location: New York, NY See attached schedule	N/A	541	None (or less than $1,001)	consulting fees	$61,045
206	T EXPRESS LLC Value reported reflects bank account holding only. Additional Underlying Asset: potential hotel deal (inactive) - value not readily ascertainable. Location: New York, NY See attached schedule	N/A	543	None (or less than $1,001)	administrative fees	$1,937
207	T PROMOTIONS LLC Value reported reflects bank account holding only. Additional Underlying Asset: administrative agent entity for gift card redemptions Location: New York, NY See attached schedule	N/A	547	$50,001 - $100,000		None (or less than $201)
208	1125 South Ocean LLC Underlying Assets: residential real estate and bank account Location: Palm Beach, FL See attached schedule	N/A	552	$5,000,001 - $25,000,000	interest	$15,001 - $50,000

THE ACCOMPANYING SCHEDULE (PART 2 - EXHIBIT A) IS AN INTEGRAL PART OF THE ABOVE AND SHOULD BE READ IN CONJUNCTION THEREWITH. Gaps in numerical sequence are due to the removal of previously reported items no longer reportable on this part. Information being reported from January 1, 2018 to December 31, 2018.

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Instructions for Part 3

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Part 3: Filer's Employment Agreements and Arrangements

#	Employer or Party	City/State	Status and Terms	Date
1.	Screen Actors Guild - Producers	Burbank, CA	Pension Plan for Motion Picture Actors; payments received on a monthly basis. The date reflects the year that Donald J. Trump began participating in the plan.	1992
2.	AMERICAN FEDERATION of TELEVISION and RADIO ARTISTS Retirement Fund	New York, NY	Pension Plan for Television and Radio Artists; payments received on a monthly basis. The date reflects the year that Donald J. Trump began participating in the plan.	1989
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4.				
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Instructions for Part 4

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Part 4: Filer's Sources of Compensation Exceeding $5,000 in a Year

#	Source Name	City/State	Brief Description of Duties
1.	N/A		
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Instructions for Part 5

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Part 5: Spouse's Employment Assets and Income

#	Description	EIF	Value	Income Type	Income Amount
1.	Melania LLC Underlying Assets: inactive Location: New York, NY	N/A	None (or less than $1,001)		None (or less than $201)
2.	MELANIA MARKS ACCESSORIES LLC Underlying Assets: licensing agreement Licensee(s): MZ BERGER & COMPANY LLC Location: New York, NY Value not readily ascertainable	N/A			None (or less than $201)
3.	MELANIA MARKS ACCESSORIES MEMBER CORP (pass-thru company for MELANIA MARKS ACCESSORIES LLC) Location: New York, NY Value not readily ascertainable	N/A			None (or less than $201)
4.	721 33H LLC Underlying Assets: residential real estate Location: New York, NY	N/A	$1,000,001 - $5,000,000		None (or less than $201)
5.	721 33H Holdings LLC (pass-thru company for 721 33H LLC) Location: New York, NY Value not readily ascertainable	N/A			None (or less than $201)
6.	Getty Images Inc. Use of photographic images Location: New York, NY Value not readily ascertainable	N/A			None (or less than $201)

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Instructions for Part 6

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Part 6: Other Assets and Income

#	Description	EIF	Value	Income Type	Income Amount
1	JP MORGAN CHASE - CHECKING AND SAVINGS ACCOUNTS	N/A	$500,001 - $1,000,000	Interest	$1,001 - $2,500
2	CAPITAL ONE BANK - CHECKING AND SAVINGS	N/A	$5,000,001 - $25,000,000	Interest	$100,001 - $1,000,000
3	SIGNATURE BANK - CHECKING	N/A	$100,001 - $250,000	Interest	$1,001 - $2,500
4	BANK UNITED, NA - MONEY MARKET	N/A	$100,001 - $250,000	Interest	$1,001 - $2,500
5	FIRST REPUBLIC BANK - CHECKING	N/A	$15,001 - $50,000	Interest	None (or less than $201)
6	INVESTMENT IN GOLD	N/A	$100,001 - $250,000		None (or less than $201)
7	WMTMF LLC (US BANK CASH ACCOUNT)	N/A	$50,001 - $100,000		None (or less than $201)
8	MBWT LLC Underlying assets are not reportable	No			
	The Fred C. Trump December 16, 1976 Trust- F/B/O Donald J. Trump				
1	JP MORGAN CHASE - SAVINGS ACCOUNT	N/A	$1,000,001 - $5,000,000	Interest	$2,501 - $5,000
1	JP MORGAN CLEARING CORP - BROKERAGE ACCOUNT - HOLDINGS				
2	ECO TEK 360 INC (f/k/a GLOBAL FASHION TECHNOLOGIES)	N/A	$1,001 - $15,000		None (or less than $201)
	The Donald J Trump Revocable Trust				
1	CAPITAL ONE BANK - CHECKING AND SAVINGS	N/A	$25,000,001 - $50,000,000	Interest	$100,001 - $1,000,000
2	PROFESSIONAL BANK - MONEY MARKET	N/A	$5,000,001 - $25,000,000	Interest	$50,001 - $100,000
3	SIGNATURE BANK - MONEY MARKET	N/A	$5,000,001 - $25,000,000	Interest	$2,501 - $5,000

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Instructions for Part 6

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Part 6: Other Assets and Income

#	Description	EIF	Value	Income Type	Income Amount
4	BANK UNITED - MONEY MARKET	N/A	$5,000,001 - $25,000,000	Interest	None (or less than $201)
	Family Trust 1*			Interest, Dividends, Capital Gains	$15,001 - $50,000
1	AMG MG PICTET INTL-Z	Y	$1,001 - $15,000		
2	DODGE & COX INTL STOCK FD	Y	$1,001 - $15,000		
3	ISHARES MSCI EAFE INDEX FUND	Y	$15,001 - $50,000		
4	ISHARES CORE MSCI EAFE ETF	Y	$1,001 - $15,000		
5	JPMORGAN BETABUILDERS CANADA ETF	Y	$1,001 - $15,000		
6	SIX CIRCLES INTERNATIONAL UNCONSTRAINED EQUITY FUND	Y	$1,001 - $15,000		
7	ARTISAN INTL VALUE FD-INS	Y	$1,001 - $15,000		
8	JPM GL RES ENH IDX FD - USD - R6	Y	$15,001 - $50,000		
9	ISHARES INC MSCI JAPAN NEW	Y	$1,001 - $15,000		
10	FIDELITY 500 INDEX FD-AI	Y	$1,001 - $15,000		
11	JPM US L/C CORE PL FD - USD - R6	Y	$15,001 - $50,000		
12	NEUBERGER BER MU/C OPP-INS	Y	$15,001 - $50,000		
13	PRIMECAP ODYSSEY STOCK FD	Y	$15,001 - $50,000		
14	SPDR S&P 500 ETF TRUST	Y	$50,001 - $100,000		
15	SIX CIRCLES U.S. UNCONSTRAINED EQUITY FUND	Y	$1,001 - $15,000		
16	BLACKSTONE ALT MULTI-STRAT- Y	Y	$1,001 - $15,000		
17	CRM LONG/SHORT OPPORTUNITIES FUND	Y	$1,001 - $15,000		

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Instructions for Part 6

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Part 6: Other Assets and Income

#	Description	EIF	Value	Income Type	Income Amount
18	BOSTON P GL LG/SH EQ-INST	Y	$1,001 - $15,000		
19	GMO SGM MAJOR MARKETS FD-VI	Y	$1,001 - $15,000		
20	US Bank Cash Account	N/A	$15,001 - $50,000		
21	LORD ABBETT SHRT DUR INC-F3	Y	$1,001 - $15,000		
22	JPM SHRT-INT MUNI BND FD - USD - I	Y	$1,001 - $15,000		
23	SIX CIRCLES TAX AWARE ULTRA SHORT	Y	$1,001 - $15,000		
24	AMERICAN FUNDS THE TAX-EXEMPT BOND FUND OF AMERICA	Y	$1,001 - $15,000		
25	DODGE & COX INCOME FD	Y	$1,001 - $15,000		
26	ISHARES BARCLAYS 1-3 YEAR TREASURY	Y	$1,001 - $15,000		
27	METROPOLITAN WEST Total Return Bond-PLN	Y	$1,001 - $15,000		
28	AQR MANAGED FUTURES STR-R6	Y	None (or less than $1,001)		
29	CHILTON STRATEGIC EUROPEAN EQUITIES FD	Y	None (or less than $1,001)		
30	FMI LARGE CAP FUND-INST	Y	None (or less than $1,001)		
31	AMERICAN BEACON GLG Total Return - Ultra	Y	None (or less than $1,001)		
32	JOHN HAN II-ABS RET CURR-R6	Y	None (or less than $1,001)		
33	MFS EMERGING MKTS DEBT FD R6	Y	None (or less than $1,001)		
34	PIMCO UNCONSTRAINED BOND-INS	Y	None (or less than $1,001)		
35	AQR LONG-SHORT EQUITY-R6	Y	None (or less than $1,001)		
36	BLACKROCK HIGH YIELD PT-BLAC	Y	None (or less than $1,001)		

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Instructions for Part 6

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Part 6: Other Assets and Income

#	Description	EIF	Value	Income Type	Income Amount
	Family Trust 2*			Interest, Dividends, Capital Gains	$15,001 - $50,000
1	AMG MG PICTET INTL-Z	Y	$1,001 - $15,000		
2	DODGE & COX INTL STOCK FD	Y	$1,001 - $15,000		
3	ISHARES MSCI EAFE INDEX FUND	Y	$15,001 - $50,000		
4	ISHARES CORE MSCI EAFE ETF	Y	$15,001 - $50,000		
5	JPMORGAN BETABUILDERS CANADA ETF	Y	$1,001 - $15,000		
6	SIX CIRCLES INTERNATIONAL UNCONSTRAINED EQUITY FUND	Y	$1,001 - $15,000		
7	ARTISAN INTL VALUE FD-INS	Y	$1,001 - $15,000		
8	JPM GL RES ENH IDX FD - USD - R6	Y	$15,001 - $50,000		
9	ISHARES INC MSCI JAPAN NEW	Y	$1,001 - $15,000		
10	FIDELITY 500 INDEX FD-AI	Y	$1,001 - $15,000		
11	JPM US L/C CORE PL FD - USD - R6	Y	$15,001 - $50,000		
12	NEUBERGER BER MU/C OPP-INS	Y	$15,001 - $50,000		
13	PRIMECAP ODYSSEY STOCK FD	Y	$15,001 - $50,000		
14	SPDR S&P 500 ETF TRUST	Y	$50,001 - $100,000		
15	SIX CIRCLES U.S. UNCONSTRAINED EQUITY FUND	Y	$15,001 - $50,000		
16	BLACKSTONE ALT MULTI-STRAT- Y	Y	$1,001 - $15,000		
17	CRM LONG/SHORT OPPORTUNITIES FUND	Y	$1,001 - $15,000		

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Instructions for Part 6

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Part 6: Other Assets and Income

#	Description	EIF	Value	Income Type	Income Amount
18	BOSTON P GL LG/SH EQ-INST	Y	$1,001 - $15,000		
19	GMO SGM MAJOR MARKETS FD-VI	Y	$1,001 - $15,000		
20	US Bank Cash Account	N/A	$15,001 - $50,000		
21	LORD ABBETT SHRT DUR INC-F3	Y	$1,001 - $15,000		
22	JPM SHRT-INT MUNI BND FD - USD - I	Y	$15,001 - $50,000		
23	SIX CIRCLES TAX AWARE ULTRA SHORT	Y	$1,001 - $15,000		
24	AMERICAN FUNDS THE TAX-EXEMPT BOND FUND OF AMERICA	Y	$1,001 - $15,000		
25	DODGE & COX INCOME FD	Y	$1,001 - $15,000		
26	ISHARES BARCLAYS 1-3 YEAR TREASURY	Y	$1,001 - $15,000		
27	METROPOLITAN WEST Total Return Bond-PLN	Y	$1,001 - $15,000		
28	BLACKROCK HIGH YIELD PORTFOLIO	Y	None (or less than $1,001)		
29	CHILTON STRATEGIC EUROPEAN EQUITIES FD	Y	None (or less than $1,001)		
30	Equinox IPM Systematic Macro Fund	Y	None (or less than $1,001)		
31	FMI LARGE CAP FUND-INST	Y	None (or less than $1,001)		
32	AMERICAN BEACON GLG Total Return - Ultra	Y	None (or less than $1,001)		
33	JOHN HAN II-ABS RET CURR-R6	Y	None (or less than $1,001)		
34	MFS EMERGING MKTS DEBT FD R6	Y	None (or less than $1,001)		
35	PIMCO UNCONSTRAINED BOND-INS	Y	None (or less than $1,001)		
36	AQR LONG-SHORT EQUITY-R6	Y	None (or less than $1,001)		

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Part 6: Other Assets and Income

#	Description	EIF	Value	Income Type	Income Amount
	Family Trust 3*			Interest, Dividends, Capital Gains	$15,001 - $50,000
1	AMG MG PICTET INTL-Z	Y	$1,001 - $15,000		
2	DODGE & COX INTL STOCK FD	Y	$1,001 - $15,000		
3	ISHARES MSCI EAFE INDEX FUND	Y	$15,001 - $50,000		
4	ISHARES CORE MSCI EAFE ETF	Y	$15,001 - $50,000		
5	JPMORGAN BETABUILDERS CANADA ETF	Y	$1,001 - $15,000		
6	SIX CIRCLES INTERNATIONAL UNCONSTRAINED EQUITY FUND	Y	$1,001 - $15,000		
7	ARTISAN INTL VALUE FD-INS	Y	$15,001 - $50,000		
8	JPM GL RES ENH IDX FD - USD - R6	Y	$15,001 - $50,000		
9	ISHARES INC MSCI JAPAN NEW	Y	$1,001 - $15,000		
10	FIDELITY 500 INDEX FD-AI	Y	$1,001 - $15,000		
11	JPM US L/C CORE PL FD - USD - R6	Y	$15,001 - $50,000		
12	NEUBERGER BER MU/C OPP-INS	Y	$15,001 - $50,000		
13	PRIMECAP ODYSSEY STOCK FD	Y	$15,001 - $50,000		
14	SPDR S&P 500 ETF TRUST	Y	$100,001 - $250,000		
15	SIX CIRCLES U.S. UNCONSTRAINED EQUITY FUND	Y	$15,001 - $50,000		
16	BLACKSTONE ALT MULTI-STRAT- Y	Y	$1,001 - $15,000		
17	CRM LONG/SHORT OPPORTUNITIES FUND	Y	$1,001 - $15,000		

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Instructions for Part 6

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Part 6: Other Assets and Income

#	Description	EIF	Value	Income Type	Income Amount
18	BOSTON P GL LG/SH EQ-INST	Y	$1,001 - $15,000		
19	GMO SGM MAJOR MARKETS FD-VI	Y	$1,001 - $15,000		
20	US Bank Cash Account	N/A	$15,001 - $50,000		
21	LORD ABBETT SHRT DUR INC-F3	Y	$1,001 - $15,000		
22	JPM SHRT-INT MUNI BND FD - USD - I	Y	$15,001 - $50,000		
23	SIX CIRCLES TAX AWARE ULTRA SHORT	Y	$1,001 - $15,000		
24	AMERICAN FUNDS THE TAX-EXEMPT BOND FUND OF AMERICA	Y	$1,001 - $15,000		
25	DODGE & COX INCOME FD	Y	$1,001 - $15,000		
26	ISHARES BARCLAYS 1-3 YEAR TREASURY	Y	$15,001 - $50,000		
27	METROPOLITAN WEST Total Return Bond-PLN	Y	$1,001 - $15,000		
28	AQR MANAGED FUTURES STR-R6	Y	None (or less than $1,001)		
29	BLACKROCK HIGH YIELD PORTFOLIO	Y	None (or less than $1,001)		
30	CHILTON STRATEGIC EUROPEAN EQUITIES FD	Y	None (or less than $1,001)		
31	AMERICAN BEACON GLG Total Return - Ultra	Y	None (or less than $1,001)		
32	JOHN HAN II-ABS RET CURR-R6	Y	None (or less than $1,001)		
33	MFS EMERGING MKTS DEBT FD R6	Y	None (or less than $1,001)		
34	PIMCO UNCONSTRAINED BOND-INS	Y	None (or less than $1,001)		
35	AQR LONG-SHORT EQUITY-R6	Y	None (or less than $1,001)		

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Instructions for Part 7

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Part 7: Transactions

#	Description	Type	Date	Amount
	Family Trust 1*			
1	ISHARES BARCLAYS 1-3 YEAR TREASURY BOND FUND	Purchase	20-Dec-2018	$1,001 - $15,000
2	BOSTON P GL LG/SH EQ-INST	Purchase	16-Nov-2018	$1,001 - $15,000
3	LORD ABBETT SHRT DUR INC-F3	Purchase	09-Nov-2018	$1,001 - $15,000
4	BLACKSTONE ALT MULTI-STRAT- Y	Purchase	09-Nov-2018	$1,001 - $15,000
5	JPMORGAN BETABUILDERS CANADA ETF	Purchase	26-Oct-2018	$1,001 - $15,000
6	JPMORGAN BETABUILDERS CANADA ETF	Purchase	26-Oct-2018	$1,001 - $15,000
7	SIX CIRCLES U.S. UNCONSTRAINED EQUITY FUND	Purchase	26-Oct-2018	$1,001 - $15,000
8	FIDELITY 500 INDEX FD-AI	Purchase	26-Oct-2018	$1,001 - $15,000
9	SIX CIRCLES TAX AWARE ULTRA SHORT DURATION FUND	Purchase	26-Oct-2018	$1,001 - $15,000
10	SIX CIRCLES INTERNATIONAL UNCONSTRAINED EQUITY FUND	Purchase	26-Oct-2018	$1,001 - $15,000
11	JPMORGAN BETABUILDERS CANADA ETF	Purchase	16-Aug-2018	$1,001 - $15,000
12	ISHARES BARCLAYS 1-3 YEAR TREASURY BOND FUND	Purchase	17-Jul-2018	$1,001 - $15,000
13	JPM SHRT-INT MUNI BND-I FUND 3602	Purchase	17-Jul-2018	$1,001 - $15,000
14	CRM LONG/SHORT OPPORTUNITIES FUND	Purchase	17-Jul-2018	$1,001 - $15,000
15	ISHARES BARCLAYS 1-3 YEAR TREASURY BOND FUND	Purchase	13-Jun-2018	$1,001 - $15,000
16	JPM SHRT-INT MUNI BND-I FUND 3602	Purchase	06-Mar-2018	$1,001 - $15,000
17	DODGE & COX INTL STOCK FD	Purchase	06-Mar-2018	$1,001 - $15,000
18	FIDELITY 500 INDEX FD-AI	Purchase	06-Mar-2018	$1,001 - $15,000
19	PIMCO SHORT-TERM FD-INSTL	Purchase	06-Mar-2018	$1,001 - $15,000

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Instructions for Part 7

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Part 7: Transactions

#	Description	Type	Date	Amount
20	FIDELITY 500 INDEX FD-AI	Purchase	12-Feb-2018	$1,001 - $15,000
21	AMER FNDS T/E BND FND AM-F3	Purchase	30-Jan-2018	$1,001 - $15,000
22	ISHARES CORE MSCI EAFE ETF	Purchase	25-Jan-2018	$1,001 - $15,000
23	SPDR S&P 500 ETF TRUST	Purchase	25-Jan-2018	$1,001 - $15,000
24	ISHARES INC MSCI JAPAN NEW	Purchase	25-Jan-2018	$1,001 - $15,000
25	PIMCO SHORT-TERM FD-INSTL	Purchase	25-Jan-2018	$1,001 - $15,000
26	METROPOLITAN WEST Total Return Bond-PLN	Purchase	25-Jan-2018	$1,001 - $15,000
27	CRM LONG/SHORT OPPORTUNITIES FUND	Purchase	25-Jan-2018	$1,001 - $15,000
28	AMERICAN BEACON GLG Total Return - Ultra	Purchase	25-Jan-2018	$1,001 - $15,000
29	GMO SGM MAJOR MARKETS FD-VI	Purchase	25-Jan-2018	$1,001 - $15,000
30	METROPOLITAN WEST Total Return Bond-PLN	Sale	20-Dec-2018	$1,001 - $15,000
31	DODGE & COX INCOME FD	Sale	20-Dec-2018	$1,001 - $15,000
32	CHILTON STRATEGIC EUROPEAN EQUITIES FD	Sale	30-Nov-2018	$1,001 - $15,000
33	CHILTON STRATEGIC EUROPEAN EQUITIES FD	Sale	16-Nov-2018	$1,001 - $15,000
34	PIMCO UNCONSTRAINED BOND-INS	Sale	09-Nov-2018	$1,001 - $15,000
35	JOHN HAN II-ABS RET CURR-R6	Sale	08-Nov-2018	$1,001 - $15,000
36	AMERICAN BEACON GLG Total Return - Ultra	Sale	08-Nov-2018	$1,001 - $15,000
37	CRM LONG/SHORT OPPORTUNITIES FUND	Sale	08-Nov-2018	$1,001 - $15,000
38	GMO SGM MAJOR MARKETS FD-VI	Sale	08-Nov-2018	$1,001 - $15,000
39	JPMORGAN GL RES ENH IDX-R6	Sale	29-Oct-2018	$1,001 - $15,000

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Part 7: Transactions

#	Description	Type	Date	Amount
40	DODGE & COX INTL STOCK FD	Sale	26-Oct-2018	$1,001 - $15,000
41	PIMCO SHORT-TERM FD-INSTL	Sale	26-Oct-2018	$1,001 - $15,000
42	FMI LARGE CAP FUND-INST	Sale	26-Oct-2018	$1,001 - $15,000
43	AMG MG PICTET INTL-Z	Sale	26-Oct-2018	$1,001 - $15,000
44	ARTISAN INTL VALUE FD-INS	Sale	26-Oct-2018	$1,001 - $15,000
45	ISHARES CORE MSCI EAFE ETF	Sale	16-Aug-2018	$1,001 - $15,000
46	AQR LONG-SHORT EQUITY-R6	Sale	17-Jul-2018	$1,001 - $15,000
47	AQR MANAGED FUTURES STR-R6	Sale	17-Jul-2018	$1,001 - $15,000
48	ISHARES MSCI EAFE INDEX FUND	Sale	08-Jun-2018	$1,001 - $15,000
49	ISHARES MSCI EAFE INDEX FUND	Sale	07-Jun-2018	$1,001 - $15,000
50	ISHARES MSCI EAFE INDEX FUND	Sale	07-Jun-2018	$1,001 - $15,000
51	PIMCO UNCONSTRAINED BOND-INS	Sale	01-Jun-2018	$1,001 - $15,000
52	FMI LARGE CAP FUND-INST	Sale	01-Jun-2018	$1,001 - $15,000
53	BLACKROCK HIGH YIELD PORTFOLIO	Sale	12-Feb-2018	$1,001 - $15,000
54	MFS EMERGING MKTS DEBT FD R6	Sale	12-Feb-2018	$1,001 - $15,000
55	PIMCO SHORT-TERM FD-INSTL	Sale	12-Feb-2018	$1,001 - $15,000
56	JPM SHRT-INT MUNI BND-I FUND 3602	Sale	25-Jan-2018	$1,001 - $15,000
57	JPMORGAN GL RES ENH IDX-R6	Sale	25-Jan-2018	$1,001 - $15,000
	Family Trust 2*			
1	ISHARES BARCLAYS 1-3 YEAR TREASURY BOND FUND	Purchase	20-Dec-2018	$1,001 - $15,000

* J.P. Morgan is the sole Trustee. Donald J. Trump retains an income interest only in the Family Trusts and has no investment decision authority.

Instructions for Part 7

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Part 7: Transactions

#	Description	Type	Date	Amount
2	BOSTON P GL LG/SH EQ-INST	Purchase	16-Nov-2018	$1,001 - $15,000
3	LORD ABBETT SHRT DUR INC-F3	Purchase	09-Nov-2018	$1,001 - $15,000
4	BLACKSTONE ALT MULTI-STRAT- Y	Purchase	09-Nov-2018	$1,001 - $15,000
5	JPMORGAN BETABUILDERS CANADA ETF	Purchase	26-Oct-2018	$1,001 - $15,000
6	JPMORGAN BETABUILDERS CANADA ETF	Purchase	26-Oct-2018	$1,001 - $15,000
7	SIX CIRCLES U.S. UNCONSTRAINED EQUITY FUND	Purchase	26-Oct-2018	$15,001 - $50,000
8	JPM SHRT-INT MUNI BND-I FUND 3602	Purchase	26-Oct-2018	$1,001 - $15,000
9	SIX CIRCLES TAX AWARE ULTRA SHORT DURATION FUND	Purchase	26-Oct-2018	$1,001 - $15,000
10	SIX CIRCLES INTERNATIONAL UNCONSTRAINED EQUITY FUND	Purchase	26-Oct-2018	$1,001 - $15,000
11	JPMORGAN BETABUILDERS CANADA ETF	Purchase	13-Aug-2018	$1,001 - $15,000
12	ISHARES BARCLAYS 1-3 YEAR TREASURY BOND FUND	Purchase	17-Jul-2018	$1,001 - $15,000
13	JPM SHRT-INT MUNI BND-I FUND 3602	Purchase	17-Jul-2018	$1,001 - $15,000
14	ISHARES BARCLAYS 1-3 YEAR TREASURY BOND FUND	Purchase	13-Jun-2018	$1,001 - $15,000
15	ISHARES CORE MSCI EAFE ETF	Purchase	27-Feb-2018	$1,001 - $15,000
16	FIDELITY 500 INDEX FD-AI	Purchase	27-Feb-2018	$1,001 - $15,000
17	JPM SHRT-INT MUNI BND-I FUND 3602	Purchase	27-Feb-2018	$1,001 - $15,000
18	PIMCO SHORT-TERM FD-INSTL	Purchase	27-Feb-2018	$1,001 - $15,000
19	FIDELITY 500 INDEX FD-AI	Purchase	12-Feb-2018	$1,001 - $15,000
20	AMER FNDS T/E BND FND AM-F3	Purchase	30-Jan-2018	$1,001 - $15,000
21	ISHARES CORE MSCI EAFE ETF	Purchase	25-Jan-2018	$1,001 - $15,000

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Instructions for Part 7

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Part 7: Transactions

#	Description	Type	Date	Amount
22	ISHARES INC MSCI JAPAN NEW	Purchase	25-Jan-2018	$1,001 - $15,000
23	SPDR S&P 500 ETF TRUST	Purchase	25-Jan-2018	$1,001 - $15,000
24	PIMCO SHORT-TERM FD-INSTL	Purchase	25-Jan-2018	$1,001 - $15,000
25	METROPOLITAN WEST Total Return Bond-PLN	Purchase	25-Jan-2018	$1,001 - $15,000
26	CRM LONG/SHORT OPPORTUNITIES FUND	Purchase	25-Jan-2018	$1,001 - $15,000
27	AMERICAN BEACON GLG Total Return - Ultra	Purchase	25-Jan-2018	$1,001 - $15,000
28	GMO SGM MAJOR MARKETS FD-VI	Purchase	25-Jan-2018	$1,001 - $15,000
29	METROPOLITAN WEST Total Return Bond-PLN	Sale	20-Dec-2018	$1,001 - $15,000
30	DODGE & COX INCOME FD	Sale	20-Dec-2018	$1,001 - $15,000
31	CHILTON STRATEGIC EUROPEAN EQUITIES FD	Sale	30-Nov-2018	$1,001 - $15,000
32	CHILTON STRATEGIC EUROPEAN EQUITIES FD	Sale	16-Nov-2018	$1,001 - $15,000
33	PIMCO UNCONSTRAINED BOND-INS	Sale	09-Nov-2018	$1,001 - $15,000
34	JOHN HAN II-ABS RET CURR-R6	Sale	08-Nov-2018	$1,001 - $15,000
35	AMERICAN BEACON GLG Total Return - Ultra	Sale	08-Nov-2018	$1,001 - $15,000
36	CRM LONG/SHORT OPPORTUNITIES FUND	Sale	08-Nov-2018	$1,001 - $15,000
37	GMO SGM MAJOR MARKETS FD-VI	Sale	08-Nov-2018	$1,001 - $15,000
38	JPMORGAN GL RES ENH IDX-R6	Sale	29-Oct-2018	$1,001 - $15,000
39	DODGE & COX INTL STOCK FD	Sale	26-Oct-2018	$1,001 - $15,000
40	PIMCO SHORT-TERM FD-INSTL	Sale	26-Oct-2018	$1,001 - $15,000
41	FMI LARGE CAP FUND-INST	Sale	26-Oct-2018	$1,001 - $15,000

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Part 7: Transactions

#	Description	Type	Date	Amount
42	PRIMECAP ODYSSEY STOCK FD	Sale	26-Oct-2018	$1,001 - $15,000
43	AMG MG PICTET INTL-Z	Sale	26-Oct-2018	$1,001 - $15,000
44	ARTISAN INTL VALUE FD-INS	Sale	26-Oct-2018	$1,001 - $15,000
45	NEUBERGER BER MU/C OPP-INS	Sale	26-Oct-2018	$1,001 - $15,000
46	ISHARES CORE MSCI EAFE ETF	Sale	13-Aug-2018	$1,001 - $15,000
47	ISHARES CORE MSCI EAFE ETF	Sale	13-Aug-2018	$1,001 - $15,000
48	AQR LONG-SHORT EQUITY-R6	Sale	17-Jul-2018	$1,001 - $15,000
49	Equinox IPM Systematic Macro Fund	Sale	17-Jul-2018	$1,001 - $15,000
50	ISHARES MSCI EAFE INDEX FUND	Sale	08-Jun-2018	$1,001 - $15,000
51	ISHARES MSCI EAFE INDEX FUND	Sale	07-Jun-2018	$1,001 - $15,000
52	ISHARES MSCI EAFE INDEX FUND	Sale	07-Jun-2018	$1,001 - $15,000
53	ISHARES MSCI EAFE INDEX FUND	Sale	11-Apr-2018	$1,001 - $15,000
54	DODGE & COX INCOME FD	Sale	11-Apr-2018	$1,001 - $15,000
55	PIMCO UNCONSTRAINED BOND-INS	Sale	11-Apr-2018	$1,001 - $15,000
56	BLACKROCK HIGH YIELD PORTFOLIO	Sale	12-Feb-2018	$1,001 - $15,000
57	MFS EMERGING MKTS DEBT FD R6	Sale	12-Feb-2018	$1,001 - $15,000
58	PIMCO SHORT-TERM FD-INSTL	Sale	12-Feb-2018	$1,001 - $15,000
59	JPM SHRT-INT MUNI BND-I FUND 3602	Sale	25-Jan-2018	$1,001 - $15,000
60	JPMORGAN GL RES ENH IDX-R6	Sale	25-Jan-2018	$1,001 - $15,000
	Family Trust 3*			

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Instructions for Part 7

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Part 7: Transactions

#	Description	Type	Date	Amount
1	ISHARES BARCLAYS 1-3 YEAR TREASURY BOND FUND	Purchase	20-Dec-2018	$1,001 - $15,000
2	BOSTON P GL LG/SH EQ-INST	Purchase	16-Nov-2018	$1,001 - $15,000
3	LORD ABBETT SHRT DUR INC-F3	Purchase	09-Nov-2018	$1,001 - $15,000
4	BLACKSTONE ALT MULTI-STRAT- Y	Purchase	09-Nov-2018	$1,001 - $15,000
5	JPMORGAN BETABUILDERS CANADA ETF	Purchase	26-Oct-2018	$1,001 - $15,000
6	JPMORGAN BETABUILDERS CANADA ETF	Purchase	26-Oct-2018	$1,001 - $15,000
7	SIX CIRCLES TAX AWARE ULTRA SHORT DURATION FUND	Purchase	26-Oct-2018	$1,001 - $15,000
8	SIX CIRCLES U.S. UNCONSTRAINED EQUITY FUND	Purchase	26-Oct-2018	$15,001 - $50,000
9	JPM SHRT-INT MUNI BND-I FUND 3602	Purchase	26-Oct-2018	$1,001 - $15,000
10	SIX CIRCLES INTERNATIONAL UNCONSTRAINED EQUITY FUND	Purchase	26-Oct-2018	$1,001 - $15,000
11	JPMORGAN BETABUILDERS CANADA ETF	Purchase	13-Aug-2018	$1,001 - $15,000
12	ISHARES BARCLAYS 1-3 YEAR TREASURY BOND FUND	Purchase	17-Jul-2018	$1,001 - $15,000
13	JPM SHRT-INT MUNI BND-I FUND 3602	Purchase	17-Jul-2018	$1,001 - $15,000
14	ISHARES BARCLAYS 1-3 YEAR TREASURY BOND FUND	Purchase	13-Jun-2018	$1,001 - $15,000
15	ISHARES CORE MSCI EAFE ETF	Purchase	27-Feb-2018	$1,001 - $15,000
16	JPM SHRT-INT MUNI BND-I FUND 3602	Purchase	27-Feb-2018	$1,001 - $15,000
17	FIDELITY 500 INDEX FD-AI	Purchase	27-Feb-2018	$1,001 - $15,000
18	PIMCO SHORT-TERM FD-INSTL	Purchase	27-Feb-2018	$1,001 - $15,000
19	FIDELITY 500 INDEX FD-AI	Purchase	12-Feb-2018	$1,001 - $15,000
20	AMER FNDS T/E BND FND AM-F3	Purchase	30-Jan-2018	$1,001 - $15,000

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Instructions for Part 7

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Part 7: Transactions

#	Description	Type	Date	Amount
21	ISHARES INC MSCI JAPAN NEW	Purchase	25-Jan-2018	$1,001 - $15,000
22	SPDR S&P 500 ETF TRUST	Purchase	25-Jan-2018	$1,001 - $15,000
23	ISHARES CORE MSCI EAFE ETF	Purchase	25-Jan-2018	$1,001 - $15,000
24	PIMCO SHORT-TERM FD-INSTL	Purchase	25-Jan-2018	$1,001 - $15,000
25	METROPOLITAN WEST Total Return Bond-PLN	Purchase	25-Jan-2018	$1,001 - $15,000
26	CRM LONG/SHORT OPPORTUNITIES FUND	Purchase	25-Jan-2018	$1,001 - $15,000
27	AMERICAN BEACON GLG Total Return - Ultra	Purchase	25-Jan-2018	$1,001 - $15,000
28	GMO SGM MAJOR MARKETS FD-VI	Purchase	25-Jan-2018	$1,001 - $15,000
29	METROPOLITAN WEST Total Return Bond-PLN	Sale	21-Dec-2018	$1,001 - $15,000
30	DODGE & COX INCOME FD	Sale	21-Dec-2018	$1,001 - $15,000
31	CHILTON STRATEGIC EUROPEAN EQUITIES FD	Sale	03-Dec-2018	$1,001 - $15,000
32	CHILTON STRATEGIC EUROPEAN EQUITIES FD	Sale	19-Nov-2018	$1,001 - $15,000
33	PIMCO UNCONSTRAINED BOND-INS	Sale	13-Nov-2018	$1,001 - $15,000
34	JOHN HAN II-ABS RET CURR-R6	Sale	09-Nov-2018	$1,001 - $15,000
35	AMERICAN BEACON GLG Total Return - Ultra	Sale	09-Nov-2018	$1,001 - $15,000
36	CRM LONG/SHORT OPPORTUNITIES FUND	Sale	09-Nov-2018	$1,001 - $15,000
37	GMO SGM MAJOR MARKETS FD-VI	Sale	09-Nov-2018	$1,001 - $15,000
38	JPMORGAN GL RES ENH IDX-R6	Sale	30-Oct-2018	$1,001 - $15,000
39	PIMCO SHORT-TERM FD-INSTL	Sale	29-Oct-2018	$1,001 - $15,000
40	PRIMECAP ODYSSEY STOCK FD	Sale	29-Oct-2018	$1,001 - $15,000

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Instructions for Part 7

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Part 7: Transactions

#	Description	Type	Date	Amount
41	AMG MG PICTET INTL-Z	Sale	29-Oct-2018	$1,001 - $15,000
42	JPMORGAN US L/C CORE PL-R6	Sale	29-Oct-2018	$1,001 - $15,000
43	ARTISAN INTL VALUE FD-INS	Sale	29-Oct-2018	$1,001 - $15,000
44	NEUBERGER BER MU/C OPP-INS	Sale	29-Oct-2018	$1,001 - $15,000
45	DODGE & COX INTL STOCK FD	Sale	29-Oct-2018	$1,001 - $15,000
46	ISHARES CORE MSCI EAFE ETF	Sale	15-Aug-2018	$1,001 - $15,000
47	ISHARES CORE MSCI EAFE ETF	Sale	15-Aug-2018	$1,001 - $15,000
48	AQR LONG-SHORT EQUITY-R6	Sale	18-Jul-2018	$1,001 - $15,000
49	AQR MANAGED FUTURES STR-R6	Sale	18-Jul-2018	$1,001 - $15,000
50	ISHARES MSCI EAFE INDEX FUND	Sale	12-Jun-2018	$1,001 - $15,000
51	ISHARES MSCI EAFE INDEX FUND	Sale	11-Jun-2018	$1,001 - $15,000
52	ISHARES MSCI EAFE INDEX FUND	Sale	11-Jun-2018	$1,001 - $15,000
53	ISHARES MSCI EAFE INDEX FUND	Sale	16-Apr-2018	$1,001 - $15,000
54	DODGE & COX INCOME FD	Sale	13-Apr-2018	$1,001 - $15,000
55	PIMCO UNCONSTRAINED BOND-INS	Sale	13-Apr-2018	$1,001 - $15,000
56	BLACKROCK HIGH YIELD PORTFOLIO	Sale	13-Feb-2018	$1,001 - $15,000
57	MFS EMERGING MKTS DEBT FD R6	Sale	13-Feb-2018	$1,001 - $15,000
58	PIMCO SHORT-TERM FD-INSTL	Sale	13-Feb-2018	$1,001 - $15,000
59	JPM SHRT-INT MUNI BND-I	Sale	26-Jan-2018	$15,001 - $50,000

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Instructions for Part 7

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Part 7: Transactions

#	Description	Type	Date	Amount
60	JPMORGAN GL RES ENH IDX-R6	Sale	26-Jan-2018	$1,001 - $15,000
1	401 North Wabash Venture LLC, condominium units, Chicago, IL **	Sales	Various	$100,001 - $250,000
2	Caribusiness Investments, S.R.L., land, Higuey, Dominican Republic **	Sale	29-Jan-2018	$1,000,001 - $5,000,000
3	Country Properties, LLC, residential real estate, Norfolk, VA **	Sale	27-Apr-2018	$100,001 - $250,000
4	D B Pace Acquisition, LLC, land, building and ff&e, New York, NY **	Sale	23-Feb-2018	$1,000,001 - $5,000,000
5	TRUMP RUFFIN TOWER I LLC, commercial real estate, Las Vegas, NV **	Sales	Various	$5,000,001 - $25,000,000
6	TRUMP NATIONAL GOLF CLUB - LOS ANGELES, land, Los Angeles, CA **	Sales	Various	$5,000,001 - $25,000,000
7	4% limited partnership interest in Starrett City Associates, L.P., residential real estate, Brooklyn, NY **	Sale	07-May-2018	$25,000,001 - $50,000,000
8	4% limited partnership interest in Spring Creek Plaza LLC, commercial real estate, Brooklyn, NY **	Sale	07-May-2018	$1,000,001 - $5,000,000
9	1125 South Ocean LLC, residential real estate, Palm Beach, FL **	Purchase	16-May-2018	$5,000,001 - $25,000,000

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** Real estate transactions entered into by business entities (as opposed to by President Trump) have always been referenced on Part 2 of the President's prior reports. Now, at the request of OGE, they are being referenced on Part 7 as well.

Instructions for Part 8

Note: This is a public form. Do not include account numbers, street addresses, or family member names. See instructions for required information.

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Part 8: Liabilities

#	Creditor Name	Type	Amount	Year Incurred	Rate	Term
1.	Ladder Capital Finance LLC	Trump Tower Commercial LLC - mortgage	Over $50,000,000	2012	4.200%	Matures in 2022
2.	Ladder Capital Finance I LLC	40 Wall Street LLC - loan	Over $50,000,000	2015	3.665%	Matures in 2025
3.	Deutsche Bank Trust Company Americas	Trump National Doral - mortgage	Over $50,000,000	2012	LIBOR + 1.75% or Prime minus .75%	Matures in 2023
4.	Deutsche Bank Trust Company Americas	Trump National Doral - mortgage	$5,000,001 - $25,000,000	2012	LIBOR + 1.75% or Prime minus .75%	Matures in 2023
5.	Investors Savings Bank	Trump Park Avenue LLC - mortgage	$5,000,001 - $25,000,000	2010	3.250%	Matures in 2020
6.	Ladder Capital Finance LLC	Trump Plaza LLC - mortgage	$5,000,001 - $25,000,000	2014	3.850%	Matures in 2024
7.	Amboy Bank	Trump National Golf Club Colts Neck LLC - mortgage	$5,000,001 - $25,000,000	2008	5.250%	Matures in 2028
8.	Chevy Chase Trust Holdings, Inc. as successor in interest to Bondy Way Development	Trump National Golf Club Washington DC LLC - mortgage	$5,000,001 - $25,000,000	2009	5.500%	Matures in 2029
9.	Royal Bank America	Seven Springs - mortgage	$5,000,001 - $25,000,000	2000	4.000%	Matures in 2019
10.	Ladder Capital Finance LLC	TIHT Commercial LLC - mortgage	$5,000,001 - $25,000,000	2016	4.050%	Matures in 2026
11.	Chicago Unit Acquisition LLC	TIHT Chicago - springing loan	Over $50,000,000	2012	Prime + 5%	Springing loan
12.	Deutsche Bank Trust Company Americas	TIHT Chicago - term loan	$25,000,001 - $50,000,000	2012	LIBOR + 2.00% or Prime minus .50%	Matures in 2024
13.	Deutsche Bank Trust Company Americas	Trump Old Post Office - loan	Over $50,000,000	2015	LIBOR + 1.75% or Prime minus .25%	Matures in 2024
14.	Professional Bank	1125 South Ocean LLC - mortgage	$5,000,001 - $25,000,000	2018	4.500%	Matures in 2048
15.						
16.						
17.						

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Instructions for Part 9

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Part 9: Gifts and Travel Reimbursements

#	Source Name	City/State	Brief Description	Value
1.	None			
2.				
3.				
4.				
5.				
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Instructions for Part 2

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Reference #		

Part 2 disclosed entities with assets over $1,000 or which produced income of over $200. This Schedule (EXHIBIT A) discloses the ownership structure of the entities on Part 2, as well as additional entities that are not disclosed on Part 2. For each of the entities below that are not disclosed on Part 2, the numerical or text label indicates which reason for non-disclosure applies. The numerical labels are as follows: *(1) have no independent value or income and are part of the entity structures listed in Part 2; (2) have no independent value or income and provide back office support functions to other entities; (3) are dormant/inactive; (4) have no independent value or income and exist to hold license deals that are prospective, inactive, or otherwise do not currently have valuable assets or create income; or (5) have no independent value or income, not inactive nor dormant, not part of an entity structure or license deal. This Schedule is being provided to ensure a complete picture of the assets and holdings of the filer. Gaps in numerical sequence are due to the removal of previously reported items no longer reportable on this exhibit. All of the interests listed below in this exhibit, which were formerly held by Donald J. Trump, directly or indirectly, are now held by The Donald J. Trump Revocable Trust.

1 4 SHADOW TREE LANE LLC *(5)

Owned by :	% Ownership	Name	Role
	1	4 SHADOW TREE LANE MEMBER CORP	Managing Member
	99	DJT HOLDINGS LLC	Member

2 4 SHADOW TREE LANE MEMBER CORP *(1)

Owned by :	% Ownership	Name	Role
	100	DJT HOLDINGS MANAGING MEMBER LLC	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	4 SHADOW TREE LANE LLC	1.00%	Managing Member

3 40 Wall Development Associates, LLC *(1)

Owned by :	% Ownership	Name	Role
	0.1	Parc Consulting, Inc.	Member
	99.9	The Donald J. Trump Revocable Trust	Member

Has ownership interest in :	Entity Name	Ownership	Title
	40 Wall Street LLC	99.90%	Member
	40 WALL STREET COMMERCIAL LLC	100.00%	Member
	40 Wall Street Member Corp.	100.00%	Shareholder

4 40 WALL STREET COMMERCIAL LLC *(2)

Owned by :	% Ownership	Name	Role
	100	40 Wall Development Associates, LLC	Member

5 40 Wall Street LLC

Owned by :	% Ownership	Name	Role
	0.1	40 Wall Street Member Corp.	Managing Member
	99.9	40 Wall Development Associates, LLC	Member

6 40 Wall Street Member Corp. *(1)

Owned by :	% Ownership	Name	Role
	100	40 Wall Development Associates, LLC	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	40 Wall Street LLC	0.10%	Managing Member

7 401 MEZZ VENTURE LLC *(1)

Owned by :	% Ownership	Name	Role
	1	TRUMP CHICAGO MANAGING MEMBER LLC	Managing Member
	49	TRUMP CHICAGO MEMBER LLC	Member
	50	TIHT CHICAGO MEMBER ACQUISITION LLC	Member

Has ownership interest in :	Entity Name	Ownership	Title
	401 North Wabash Venture LLC	100.00%	Member
	TRUMP CHICAGO RETAIL LLC	100.00%	Member

8 401 North Wabash Venture LLC

Owned by :	% Ownership	Name	Role
	100	401 MEZZ VENTURE LLC	Member

Has ownership interest in :	Entity Name	Ownership	Title
	TRUMP COMMERCIAL CHICAGO LLC	100.00%	Member

	TRUMP PAYROLL CHICAGO LLC	100.00%	Managing Member	

9 *809 NORTH CANON LLC*

Owned by :	% Ownership	Name		Role
	1	809 NORTH CANON MEMBER CORPORATION		Managing Member
	99	DJT HOLDINGS LLC		Member

10 *809 NORTH CANON MEMBER CORPORATION *(1)*

Owned by :	% Ownership	Name		Role
	100	DJT HOLDINGS MANAGING MEMBER LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	809 NORTH CANON LLC	1.00%	Managing Member	

11 *81 Pine Note Holder Inc. *(3)*

Owned by :	% Ownership	Name	Role
	100	DJT Holdings LLC	Shareholder

12 *845 UN Limited Partnership*

Owned by :	% Ownership	Name	Role
	60	Trump 845 LP LLC	Partner
	40	Trump 845 UN GP LLC	Partner

13 *Ace Entertainment Holdings Inc. *(3)*

Owned by :	% Ownership	Name	Role
	100	DJT Holdings LLC	Shareholder

14 *All County Building Supply & Maintenance Corp. *(3)*

Owned by :	% Ownership	Name	Role
	25	DJT Holdings LLC	Shareholder
	75	Trump Family Members	Shareholder

15 *AVIATION PAYROLL COMPANY *(2)*

Owned by :	% Ownership	Name	Role
	100	DJT HOLDINGS MANAGING MEMBER LLC	Shareholder

17 *Beach Haven Apartments #3 LLC *(3)*

Owned by :	% Ownership	Name	Role
	25	The Donald J. Trump Revocable Trust	Member
	75	Trump Family Members	Member

18 *Beach Haven Apt #1, Inc. *(1)*

Owned by :	% Ownership	Name		Role
	25	The Donald J. Trump Revocable Trust		Shareholder
	75	Trump Family Members		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	Starrett City Associates, L.P.	0.86%	Partner	
	Spring Creek Plaza LLC	0.86%	Member	

20 *Beach Haven Shopping Center LLC *(3)*

Owned by :	% Ownership	Name	Role
	25	DJT Holdings LLC	Member
	75	Trump Family Members	Member

21 *Bedford Hills Corp. *(1)*

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	Seven Springs LLC	0.10%	Member	

22 *TRUMP BRIARCLIFF MANOR DEVELOPMENT LLC *(2)*

Owned by :	% Ownership	Name	Role
	0.1	BRIARCLIFF PROPERTIES, INC.	Member
	99.9	DJT HOLDINGS LLC	Member

23 *Briar Hall Operations LLC *(3)*

Owned by :	% Ownership	Name	Role

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	0.1	Development Member Inc.		Member
	99.9	DJT Holdings LLC		Member

24 ***BRIARCLIFF PROPERTIES, INC. *(1)***

Owned by :	% Ownership	Name		Role
	100	DJT HOLDINGS MANAGING MEMBER LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	BRIAR HALL DEVELOPMENT LLC (N/K/A TRUMP BRIARCLIFF MANOR DEVELOPMENT LLC)	0.10%	Member	

25 ***Caribusiness Investments, S.R.L.***

Owned by :	% Ownership	Name		Role
	1	THE CARIBUSINESS RE CORP		Member
	99	CARIBUSINESS MRE LLC		Member

26 ***CARIBUSINESS MRE LLC *(1)***

Owned by :	% Ownership	Name		Role
	1	THE CARIBUSINESS RE CORP		Managing Member
	99	DJT Holdings LLC		Member
Has ownership interest in :	Entity Name	Ownership	Title	
	Caribusiness Investments, S.R.L.	99.00%	Member	

27 ***Chelsea Hall LLC *(3)***

Owned by :	% Ownership	Name		Role
	25	DJT Holdings LLC		Member
	75	Trump Family Members		Member

28 ***CHICAGO UNIT ACQUISITION LLC *(5)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Member

29 ***CHINA TRADEMARK LLC *(3)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Member

30 ***Clyde Hall, Inc. *(3)***

Owned by :	% Ownership	Name		Role
	25	DJT Holdings LLC		Shareholder
	75	Trump Family Members		Shareholder

31 ***Coronet Hall, Inc. *(3)***

Owned by :	% Ownership	Name		Role
	25	DJT Holdings LLC		Shareholder
	75	Trump Family Members		Shareholder

32 ***Country Apartments, LLC***

Owned by :	% Ownership	Name		Role
	25	DJT Holdings LLC		Member
	75	Trump Family Members		Member

33 ***Country Investors LLC *(3)***

Owned by :	% Ownership	Name		Role
	25	DJT Holdings LLC		Member
	75	Trump Family Members		Member

34 ***Country Properties, LLC***

Owned by :	% Ownership	Name		Role
	25	DJT Holdings LLC		Member
	75	Trump Family Members		Member

35 ***D B PACE ACQUISITION MEMBER CORP *(1)***

Owned by :	% Ownership	Name		Role
	100	DJT HOLDINGS MANAGING MEMBER LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	D B Pace Acquisition, LLC	1.00%	Managing Member	

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36 *D B Pace Acquisition, LLC*

Owned by :	% Ownership	Name		Role
	1	D B PACE ACQUISITION MEMBER CORP		Managing Member
	99	DJT Holdings LLC		Member

37 *Development Member Inc. *(3)*

Owned by :	% Ownership	Name		Role
	100	DJT HOLDINGS MANAGING MEMBER LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	Briar Hall Operations LLC	0.10%	Member	

38 *DJ Aerospace (Bermuda) Limited *(3)--DISSOLVED 7/2/18*

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Shareholder

39 *DJT AEROSPACE LLC*

Owned by :	% Ownership	Name		Role
	100	The Donald J. Trump Revocable Trust		Member

40 *DJT ENTREPRENEUR MANAGING MEMBER LLC *(1)*

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Member
Has ownership interest in :	Entity Name	Ownership	Title	
	THE TRUMP ENTREPRENEUR INITIATIVE LLC (NY DOMESTIC)	0.10%	Managing Member	

41 *DJT ENTREPRENEUR MEMBER LLC *(1)*

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Member
Has ownership interest in :	Entity Name	Ownership	Title	
	THE TRUMP ENTREPRENEUR INITIATIVE LLC (NY DOMESTIC)	91.90%	Member	

42 *DJT HOLDINGS LLC*

Assumed Names :	D/B/A	Jurisdiction	Expiration Date	Filing Date
	DJT 3 HOLDINGS LLC	Florida		
Owned by :	% Ownership	Name		Role
	1	DJT HOLDINGS MANAGING MEMBER LLC		Managing Member
	99	The Donald J. Trump Revocable Trust		Member

Has ownership interest in : various entities as indicated elsewhere in this schedule

43 *DJT HOLDINGS MANAGING MEMBER LLC *(1)*

Owned by :	% Ownership	Name		Role
	100	The Donald J. Trump Revocable Trust		Member

Has ownership interest in : various entities as indicated elsewhere in this schedule

44 *DJT LAND HOLDINGS MEMBER CORP *(3)*

Owned by :	% Ownership	Name		Role
	100	DJT HOLDINGS MANAGING MEMBER LLC		Shareholder

45 *DJT OPERATIONS CX LLC *(5)*

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Member

46 *DJT OPERATIONS I LLC*

Owned by :	% Ownership	Name		Role
	100	The Donald J. Trump Revocable Trust		Member

47 *DJT OPERATIONS II LLC *(1)*

Owned by :	% Ownership	Name		Role
	100	The Donald J. Trump Revocable Trust		Member

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Has ownership interest in :	Entity Name	Ownership	Title
	TAG AIR INC.	100.00%	Shareholder

48 ***Donald J Trump Enterprises LLC *(3)***

Owned by :	% Ownership	Name	Role
	100	Trump Family Members	Member

49 ***Donald J. Trump Enterprises II LLC *(3)***

Owned by :	% Ownership	Name	Role
	100	Trump Family Members	Member

50 ***Donald J. Trump Enterprises III LLC *(3)***

Owned by :	% Ownership	Name	Role
	100	Trump Family Members	Member

53 ***DT APP WARRANT HOLDING LLC *(3)***

Owned by :	% Ownership	Name	Role
	1	DT APP WARRANT HOLDING MANAGING MEMBER CORP	Managing Member
	99	DTTM OPERATIONS LLC	Member

54 ***DT APP WARRANT HOLDING MANAGING MEMBER CORP *(3)***

Owned by :	% Ownership	Name	Role
	100	DTTM Operations Managing Member Corp	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	DT APP WARRANT HOLDING LLC	1.00%	Managing Member

55 ***DT CONNECT II LLC***

Owned by :	% Ownership	Name	Role
	1	DT CONNECT II MEMBER CORP	Managing Member
	99	DJT HOLDINGS LLC	Member

56 ***DT CONNECT II MEMBER CORP *(1)***

Owned by :	% Ownership	Name	Role
	100	The Donald J. Trump Revocable Trust	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	DT CONNECT II LLC	1.00%	Managing Member

59 ***DT DUBAI GOLF MANAGER LLC***

Owned by :	% Ownership	Name	Role
	1	DT DUBAI GOLF MANAGER MEMBER CORP	Managing Member
	99	DJT Holdings LLC	Member

60 ***DT DUBAI GOLF MANAGER MEMBER CORP *(1)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	DT DUBAI GOLF MANAGER LLC	1.00%	Managing Member

61 ***DT DUBAI II GOLF MANAGER LLC *(4)***

Owned by :	% Ownership	Name	Role
	1	DT DUBAI II GOLF MANAGER MEMBER CORP	Managing Member
	99	TTTT VENTURE LLC	Member

62 ***DT DUBAI II GOLF MANAGER MEMBER CORP *(4)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	DT DUBAI II GOLF MANAGER LLC	1.00%	Managing Member

63 ***DT HOME MARKS INTERNATIONAL LLC***

Owned by :	% Ownership	Name	Role

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	1	DT HOME MARKS INTERNATIONAL MEMBER CORP		Managing Member
	99	DTTM OPERATIONS LLC		Member

64 **DT HOME MARKS INTERNATIONAL MEMBER CORP *(1)**

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	DT HOME MARKS INTERNATIONAL LLC	1.00%	Managing Member	

65 **DT INDIA VENTURE LLC *(3)**

Owned by :	% Ownership	Name		Role
	1	DT INDIA VENTURE MANAGING MEMBER CORP		Member
	99	DTTM OPERATIONS LLC		Member

66 **DT INDIA VENTURE MANAGING MEMBER CORP *(3)**

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	DT INDIA VENTURE LLC	1.00%	Member	

67 **DT MARKS BAKU LLC *(3)**

Owned by :	% Ownership	Name		Role
	1	DT MARKS BAKU MANAGING MEMBER CORP		Managing Member
	99	DTTM OPERATIONS LLC		Member

68 **DT MARKS BAKU MANAGING MEMBER CORP *(3)**

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	DT MARKS BAKU LLC	1.00%	Managing Member	

71 **DT MARKS DUBAI LLC *(4)**

Owned by :	% Ownership	Name		Role
	1	DT MARKS DUBAI MEMBER CORP		Managing Member
	99	DTTM OPERATIONS LLC		Member

72 **DT MARKS DUBAI MEMBER CORP *(4)**

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	DT MARKS DUBAI LLC	1.00%	Managing Member	

73 **DT MARKS GURGAON LLC *(4)**

Owned by :	% Ownership	Name		Role
	1	DT MARKS GURGAON MANAGING MEMBER CORP		Managing Member
	99	DTTM OPERATIONS LLC		Member

74 **DT MARKS GURGAON MANAGING MEMBER CORP *(4)**

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	DT MARKS GURGAON LLC	1.00%	Managing Member	

75 **DT MARKS JERSEY CITY LLC *(4)**

Owned by :	% Ownership	Name		Role
	100	DTTM OPERATIONS LLC		Member

76 **DT MARKS JUPITER LLC *(4)**

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Owned by :	% Ownership	Name		Role
	100	DTTM OPERATIONS LLC		Managing Member

77 ***DT MARKS PRODUCTS INTERNATIONAL LLC *(4)***

Owned by :	% Ownership	Name		Role
	1	DT MARKS PRODUCTS INTERNATIONAL MEMBER CORP		Managing Member
	99	DTTM OPERATIONS LLC		Member

78 ***DT MARKS PRODUCTS INTERNATIONAL MEMBER CORP *(4)***

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	DT MARKS PRODUCTS INTERNATIONAL LLC	1.00%	Managing Member	

79 ***DT MARKS PUNE II LLC *(3)***

Owned by :	% Ownership	Name		Role
	1	DT MARKS PUNE II MANAGING MEMBER CORP		Managing Member
	99	DTTM OPERATIONS LLC		Member

80 ***DT MARKS PUNE II MANAGING MEMBER CORP *(3)***

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	DT MARKS PUNE II LLC	1.00%	Managing Member	

81 ***DT MARKS PUNE LLC *(4)***

Owned by :	% Ownership	Name		Role
	1	DT MARKS PUNE MANAGING MEMBER CORP		Managing Member
	99	DTTM OPERATIONS LLC		Member

82 ***DT MARKS PUNE MANAGING MEMBER CORP *(4)***

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	DT MARKS PUNE LLC	1.00%	Managing Member	

85 ***DT MARKS RIO LLC *(3)***

Owned by :	% Ownership	Name		Role
	1	DT MARKS RIO MEMBER CORP		Managing Member
	99	DTTM OPERATIONS LLC		Member

86 ***DT MARKS RIO MEMBER CORP *(3)***

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	DT MARKS RIO LLC	1.00%	Managing Member	

87 ***DT MARKS VANCOUVER LP *(4)***

Owned by :	% Ownership	Name	Title
	1	DT MARKS VANCOUVER MEMBER CORP	General Partner
	99	The Donald J. Trump Revocable Trust	Limited Partner

88 ***DT MARKS VANCOUVER MEMBER CORP *(4)***

Owned by :	% Ownership	Name	Role
	100	DTTM Operations Managing Member Corp	Shareholder

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Has ownership interest in :	**Entity Name** DT MARKS VANCOUVER LP	**Ownership** 1.000000 units (100.00 %)	**Title** General Partner	

89 ***DT Marks Worli LLC***

Owned by :	**% Ownership**	**Name**	**Role**
	1	DT Marks Worli Member Corp	Managing Member
	99	DTTM OPERATIONS LLC	Member

90 ***DT Marks Worli Member Corp *(1)***

Owned by :	**% Ownership** 100	**Name** DTTM Operations Managing Member Corp		**Role** Shareholder
Has ownership interest in :	**Entity Name** DT Marks Worli LLC	**Ownership** 1.00%	**Title** Managing Member	

91 ***DT TOWER GURGAON LLC *(4)***

Owned by :	**% Ownership**	**Name**	**Role**
	1	DT TOWER GURGAON MANAGING MEMBER CORP	Managing Member
	99	TTTT Venture LLC	Member

92 ***DT TOWER GURGAON MANAGING MEMBER CORP *(4)***

Owned by :	**% Ownership** 100	**Name** DTTM Operations Managing Member Corp		**Role** Shareholder
Has ownership interest in :	**Entity Name** DT TOWER GURGAON LLC	**Ownership** 1.00%	**Title** Managing Member	

93 ***DTW VENTURE LLC***

Owned by :	**% Ownership** 100	**Name** DJT Holdings LLC	**Role** Member

94 ***DTW VENTURE MANAGING MEMBER CORP. *(3)***

Owned by :	**% Ownership** 100	**Name** DJT Holdings Managing Member LLC	**Role** Shareholder

95 ***EID Venture I Corporation *(3)***

Owned by :	**% Ownership** 100	**Name** DTTM Operations Managing Member Corp		**Role** Shareholder
Has ownership interest in :	**Entity Name** EID Venture I LLC	**Ownership** 1.00%	**Title** Managing Member	

ownership should have been reflected on prior reports

96 ***EID Venture I LLC *(3)***

Owned by :	**% Ownership**	**Name**	**Role**
	1	EID Venture I Corporation	Managing Member
	99	DTTM OPERATIONS LLC	Member

97 ***Excel Venture I Corporation *(1)***

Owned by :	**% Ownership** 100	**Name** DJT Holdings Managing Member LLC		**Role** Shareholder
Has ownership interest in :	**Entity Name** Excel Venture I LLC	**Ownership** 1.00%	**Title** Managing Member	

98 ***Excel Venture I LLC***

Owned by :	**% Ownership**	**Name**	**Role**
	1	Excel Venture I Corporation	Managing Member
	99	DJT HOLDINGS LLC	Member

99 ***Fifty-Seven Management Corp. *(1)***

Owned by :	**% Ownership** 100	**Name** The Donald J. Trump Revocable Trust		**Role** Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	

	Fifty-Seventh Street Associates LLC	1.00%	Managing Member	

100 ***Fifty-Seventh Street Associates LLC***

Owned by :	% Ownership	Name		Role
	1	Fifty-Seven Management Corp.		Managing Member
	99	The Trump-Equitable Fifth Avenue Company		Member

101 ***FIRST MEMBER INC *(1)***

Owned by :	% Ownership	Name		Role
	100	The Donald J. Trump Revocable Trust		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP PALACE/PARC LLC	0.10%	Managing Member	

102 ***FLIGHTS INC *(5)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder

103 ***FLORIDA PROPERTIES MANAGEMENT LC *(2)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Member

104 ***Fountainbleu Apartments LLC *(3)***

Owned by :	% Ownership	Name		Role
	25	DJT Holdings LLC		Member
	75	Trump Family Members		Member

105 ***Golf Productions LLC***

Owned by :	% Ownership	Name		Role
	1	Golf Productions Member Corp		Managing Member
	99	DJT Holdings LLC		Member

106 ***Golf Productions Member Corp *(1)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	Golf Productions LLC	1.00%	Managing Member	

107 ***Golf Recreation Scotland Limited***

Owned by :	% Ownership	Name		Role
	100	TURNBERRY SCOTLAND LLC		Sole Member
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP TURNBERRY	100.00%	Shareholder	

108 ***HELICOPTER AIR SERVICES INC *(3)***

Owned by :	% Ownership	Name		Role
	100	DJT HOLDINGS MANAGING MEMBER LLC		Shareholder

110 ***Hudson Waterfront Associates I, LP *(1)***

Owned by :	% Ownership	Name		Role
	1	HUDSON WATERFRONT I CORPORATION		Partner
	69	HUDSON WESTSIDE ASSOCIATES I, L.P.		Partner
	30	The Donald J. Trump Revocable Trust		Partner
Has ownership interest in :	Entity Name	Ownership	Title	
	HWA 555 Owners, LLC	100.00%	Partner	

111 ***Hudson Waterfront Associates II, LP *(5)***

Owned by :	% Ownership	Name		Role
	1	HUDSON WATERFRONT II CORPORATION		Partner

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	69	HUDSON WESTSIDE ASSOCIATES II, L.P.		Partner
	30	The Donald J. Trump Revocable Trust		Partner

112 ***Hudson Waterfront Associates III, LP *(1)***

Owned by :	% Ownership	Name		Role
	1	HUDSON WATERFRONT III CORPORATION		Partner
	69	HUDSON WESTSIDE ASSOCIATES III, L.P.		Partner
	30	The Donald J. Trump Revocable Trust		Partner
Has ownership interest in :	Entity Name	Ownership	Title	
	HWA 1290 III LLC	100.00%	Partner	

113 ***Hudson Waterfront Associates IV, LP *(1)***

Owned by :	% Ownership	Name		Role
	1	HUDSON WATERFRONT IV CORPORATION		Partner
	69	HUDSON WESTSIDE ASSOCIATES IV, L.P.		Partner
	30	The Donald J. Trump Revocable Trust		Partner
Has ownership interest in :	Entity Name	Ownership	Title	
	HWA 1290 IV LLC	100.00%	Partner	

114 ***Hudson Waterfront Associates V LP *(1)***

Owned by :	% Ownership	Name		Role
	1	HUDSON WATERFRONT V CORPORATION		Partner
	69	HUDSON WESTSIDE ASSOCIATES V, L.P.		Partner
	30	The Donald J. Trump Revocable Trust		Partner
Has ownership interest in :	Entity Name	Ownership	Title	
	HWA 1290 V LLC	100.00%	Partner	

116 ***Indian Hills Holdings LLC *(3)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Member

117 ***TRUMP NATIONAL GOLF CLUB - JUPITER***

Owned by :	% Ownership	Name		Role
	1	JUPITER GOLF CLUB MANAGING MEMBER CORP		Managing Member
	99	DJT HOLDINGS LLC		Member

118 ***JUPITER GOLF CLUB MANAGING MEMBER CORP *(1)***

Owned by :	% Ownership	Name		Role
	100	DJT HOLDINGS MANAGING MEMBER LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP NATIONAL GOLF CLUB - JUPITER	1.00%	Managing Member	

119 ***LAMINGTON FAMILY HOLDINGS LLC***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Member

120 ***TRUMP NATIONAL GOLF CLUB - BEDMINSTER***

Owned by :	% Ownership	Name		Role
	100	LFB ACQUISITION LLC		Member

121 ***Lawrence Towers Apartments LLC *(3)***

Owned by :	% Ownership	Name		Role
	25	DJT Holdings LLC		Member
	75	Trump Family Members		Member

122 ***LFB ACQUISITION LLC *(1)***

Owned by :	% Ownership	Name		Role

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	1	LFB ACQUISITION MEMBER CORP		Managing Member
	99	DJT HOLDINGS LLC		Member
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP NATIONAL GOLF CLUB - BEDMINSTER	100.00%	Member	

123 LFB ACQUISITION MEMBER CORP *(1)

Owned by :	**% Ownership**	**Name**		**Role**
	100	DJT HOLDINGS MANAGING MEMBER LLC		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	LFB ACQUISITION LLC	1.00%	Managing Member	

125 MAR-A-LAGO CLUB INC *(1)

Owned by :	**% Ownership**	**Name**		**Role**
	100	DJT HOLDINGS MANAGING MEMBER LLC		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	MAR-A-LAGO CLUB, L.L.C.	0.01%	Member	
	MALC, Inc.	100.00%	Shareholder	

126 MAR-A-LAGO CLUB, L.L.C.

Assumed Names :	**D/B/A**			
	MAR-A-LAGO CLUB, L.L.C., L.C.			
Owned by :	**% Ownership**	**Name**		**Role**
	0.01	MAR-A-LAGO CLUB INC		Member
	99.99	The Donald J. Trump Revocable Trust		Member

127 Midland Associates *(3)

Owned by :	**% Ownership**	**Name**		**Role**
	25	DJT Holdings LLC		Partner
	75	Trump Family Members		Partner

128 NITTO WORLD CO., LIMITED *(3)

Owned by :	**% Ownership**	**Name**		**Role**
	100	TRUMP TURNBERRY		Shareholder

129 OCEAN DEVELOPMENT MEMBER INC *(3)

Owned by :	**% Ownership**	**Name**		**Role**
	100	DJT Holdings LLC		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	OCEAN DEVELOPMENT SERVICES LLC	1.00%	Member	

131 One Central Park West Associates *(3)

Owned by :	**% Ownership**	**Name**		**Role**
	50	TRUMP CENTRAL PARK WEST CORP		Partner
	50	GALBREATH COLUMBUS CIRCLE DEVELOPMENT ASSOCIATES, L.P.		Partner
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	One Central Park West PT Associates	34.30%	Member	

132 One Central Park West PT Associates *(3)

Owned by :	**% Ownership**	**Name**		**Role**
	34.3	One Central Park West Associates		Partner
	65.7	CPW PT Partners, G.P.		Partner

133 OPO HOTEL MANAGER LLC *(5)

Owned by :	**% Ownership**	**Name**		**Role**
	1	OPO HOTEL MANAGER MEMBER CORP		Managing Member
	22.50	Trump Family Members		Member
	76.50	DJT HOLDINGS LLC		Member

134 OPO HOTEL MANAGER MEMBER CORP *(1)

Owned by :	**% Ownership**	**Name**		**Role**
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	

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	OPO HOTEL MANAGER LLC	1.00%	Managing Member

135 ***OWO DEVELOPER LLC *(3)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings LLC	Member

136 ***PANAMA OCEAN CLUB MANAGEMENT LLC *(3)***

Owned by :	% Ownership	Name	Role
	1	PANAMA OCEAN CLUB MANAGEMENT MEMBER CORP	Managing Member
	99	DJT Holdings LLC	Member

137 ***PANAMA OCEAN CLUB MANAGEMENT MEMBER CORP *(3)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	PANAMA OCEAN CLUB MANAGEMENT LLC	1.00%	Managing Member	

140 ***Parc Consulting, Inc. *(1)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	40 Wall Development Associates, LLC	0.10%	Member	

141 ***Park Briar Associates *(1)***

Owned by :	% Ownership	Name		Role
	25	The Donald J. Trump Revocable Trust		Partner
	75	Trump Family Members		Partner
Has ownership interest in :	Entity Name	Ownership	Title	
	Starrett City Associates, L.P.	1.47%	Partner	
	Spring Creek Plaza LLC	1.47%	Member	

142 ***PINE HILL DEVELOPMENT LLC***

Owned by :	% Ownership	Name	Role
	1	PINE HILL DEVELOPMENT MANAGING MEMBER CORP	Managing Member
	99	DJT HOLDINGS LLC	Member

143 ***PINE HILL DEVELOPMENT MANAGING MEMBER CORP *(1)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	PINE HILL DEVELOPMENT LLC	1.00%	Managing Member	

144 ***Plaza Consulting Corp. *(1)***

Owned by :	% Ownership	Name		Role
	100	The Donald J. Trump Revocable Trust		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	The East 61 Street Company, LP	0.10%	Partner	

147 ***Reg-Tru Equities, LTD *(3)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder

150 ***RPV DEVELOPMENT LLC *(1)***

Owned by :	% Ownership	Name		Role
	100	DJT HOLDINGS MANAGING MEMBER LLC		Member
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP NATIONAL GOLF CLUB - LOS ANGELES	100.00%	Shareholder	

151 ***SCOTLAND ACQUISITIONS LLC *(3)***

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Owned by:	% Ownership	Name		Role
	100	DJT Holdings LLC		Member

153 ***Seven Springs LLC***

Owned by:	% Ownership	Name		Role
	0.1	Bedford Hills Corp.		Managing Member
	99.9	DJT HOLDINGS LLC		Member

154 ***Shore Haven Apt#1, Inc. *(1)***

Owned by:	% Ownership	Name		Role
	25	The Donald J. Trump Revocable Trust		Shareholder
	75	Trump Family Members		Shareholder
Has ownership interest in:	Entity Name	Ownership	Title	
	Starrett City Associates, L.P.	1.72%	Partner	
	Spring Creek Plaza LLC	1.72%	Member	

156 ***Shore Haven Shopping Center LLC *(3)***

Owned by:	% Ownership	Name		Role
	25	DJT Holdings LLC		Member
	75	Trump Family Members		Member

157 ***TRUMP TURNBERRY***

Owned by:	% Ownership	Name		Role
	100	Golf Recreation Scotland Limited		Sole Shareholder
Has ownership interest in:	Entity Name	Ownership	Title	
	NITTO WORLD CO., LIMITED	100.00%	Shareholder	

159 ***Sussex Hall, Inc. *(3)***

Owned by:	% Ownership	Name		Role
	25	The Donald J. Trump Revocable Trust		Shareholder
	75	Trump Family Members		Shareholder

160 ***T International Realty LLC***

Owned by:	% Ownership	Name	Role
	55	The Donald J. Trump Revocable Trust	Managing Member
	45	Trump Family Members	Member

161 ***TAG AIR INC. *(2)***

Owned by:	% Ownership	Name		Role
	100	DJT OPERATIONS II LLC		Shareholder

162 ***THC BAKU HOTEL MANAGER SERVICES LLC *(4)***

Owned by:	% Ownership	Name		Role
	1	THC BAKU HOTEL MANAGER SERVICES MEMBER CORP.		Managing Member
	99	DJT Holdings LLC		Member

163 ***THC BAKU HOTEL MANAGER SERVICES MEMBER CORP. *(4)***

Owned by:	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in:	Entity Name	Ownership	Title	
	THC BAKU HOTEL MANAGER SERVICES LLC	1.00%	Managing Member	

164 ***THC BAKU SERVICES LLC *(4)***

Owned by:	% Ownership	Name		Role
	1	THC BAKU SERVICES MEMBER CORP		Managing Member
	99	DJT Holdings LLC		Member

165 ***THC BAKU SERVICES MEMBER CORP *(4)***

Owned by:	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in:	Entity Name	Ownership	Title	

THC BAKU SERVICES LLC	1.00%	Managing Member	

166 ***THC Barra Hotelaria LTDA. *(4)***

Owned by :	% Ownership	Name	Role
	99	DJT Holdings LLC	Shareholder
	1	THC DEVELOPMENT BRAZIL MANAGING MEMBER CORP	Shareholder

167 ***THC CENTRAL RESERVATIONS LLC***

Owned by :	% Ownership	Name	Role
	1	THC CENTRAL RESERVATIONS MEMBER CORP	Managing Member
	99	DJT Holdings LLC	Member

168 ***THC CENTRAL RESERVATIONS MEMBER CORP *(1)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	THC CENTRAL RESERVATIONS LLC	1.00%	Managing Member

169 ***THC CHINA DEVELOPMENT LLC***

Owned by :	% Ownership	Name	Role
	100	TRUMP INTERNATIONAL HOTELS MANAGEMENT LLC	Member

170 ***THC CHINA TECHNICAL SERVICES LLC *(3)***

Owned by :	% Ownership	Name	Role
	1	THC CHINA TECHNICAL SERVICES MANAGER CORP	Managing Member
	99	DJT Holdings LLC	Member

171 ***THC CHINA TECHNICAL SERVICES MANAGER CORP *(3)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	THC CHINA TECHNICAL SERVICES LLC	1.00%	Managing Member

172 ***THC DEVELOPMENT BRAZIL LLC. *(3)***

Owned by :	% Ownership	Name	Role
	1	THC DEVELOPMENT BRAZIL MANAGING MEMBER CORP	Managing Member
	99	DJT Holdings LLC	Member

173 ***THC DEVELOPMENT BRAZIL MANAGING MEMBER CORP *(3)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	THC DEVELOPMENT BRAZIL LLC.	1.00%	Managing Member
	THC Barra Hotelaria LTDA	1.00%	Managing Member

176 ***THC HOTEL DEVELOPMENT LLC *(3)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings LLC	Member

177 ***THC IMEA DEVELOPMENT LLC***

Owned by :	% Ownership	Name	Role
	100	TRUMP INTERNATIONAL HOTELS MANAGEMENT LLC	Member

178 ***THC MIAMI RESTAURANT HOSPITALITY LLC***

Owned by :	% Ownership	Name	Role

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	1	THC MIAMI RESTAURANT HOSPITALITY MEMBER CORP	Managing Member
	99	DJT Holdings LLC	Member

179 ***THC MIAMI RESTAURANT HOSPITALITY MEMBER CORP *(1)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	THC MIAMI RESTAURANT HOSPITALITY LLC	1.00%	Managing Member

182 ***THC RIO MANAGER LLC *(3)***

Owned by :	% Ownership	Name	Role
	1	THC RIO MANAGING MEMBER CORP	Managing Member
	99	DJT Holdings LLC	Member

183 ***THC RIO MANAGING MEMBER CORP *(3)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	THC RIO MANAGER LLC	1.00%	Managing Member

184 ***THC SALES & MARKETING LLC***

Owned by :	% Ownership	Name	Role
	1	THC SALES & MARKETING MEMBER CORP	Managing Member
	99	DJT Holdings LLC	Member

185 ***THC SALES & MARKETING MEMBER CORP *(1)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	THC SALES & MARKETING LLC	1.00%	Managing Member

186 ***THC SERVICES SHENZHEN LLC *(3)***

Owned by :	% Ownership	Name	Role
	1	THC SERVICES SHENZHEN MEMBER CORP	Managing Member
	99	DJT Holdings LLC	Member

187 ***THC SERVICES SHENZHEN MEMBER CORP *(3)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	THC SERVICES SHENZHEN LLC	1.00%	Managing Member

188 ***THC SHENZHEN HOTEL MANAGER LLC *(3)***

Owned by :	% Ownership	Name	Role
	1	THC SHENZHEN HOTEL MANAGER MEMBER CORP	Managing Member
	99	DJT Holdings LLC	Member

189 ***THC SHENZHEN HOTEL MANAGER MEMBER CORP *(3)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	THC SHENZHEN HOTEL MANAGER LLC	1.00%	Managing Member

190 ***THC VANCOUVER MANAGEMENT CORP***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder

191 ***THC VANCOUVER PAYROLL ULC *(2)***

Owned by :	% Ownership	Name	Role

	100	THC VANCOUVER MANAGEMENT CORP		Member

192 **_THC VENTURE I LLC *(3)_**

Owned by :	% Ownership	Name		Role
	99	DJT HOLDINGS LLC		Member
	1	THC VENTURE I MANAGING MEMBER CORP		Member

193 **_THC VENTURE I MANAGING MEMBER CORP. *(3)_**

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	THC VENTURE I LLC	1.00%	Managing Member	

194 **_THC VENTURE II LLC *(3)_**

Owned by :	% Ownership	Name		Role
	1	THC VENTURE II MANAGING MEMBER CORP.		Managing Member
	99	DTTM OPERATIONS LLC		Member

195 **_THC VENTURE II MANAGING MEMBER CORP. *(3)_**

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	THC VENTURE II LLC	1.00%	Managing Member	

196 **_THC VENTURE III LLC - N/K/A TTTT Venture LLC *(1)_**

Owned by :	% Ownership	Name		Role
	1	TTTT Venture Member Corp		Managing Member
	76.272	DTTM OPERATIONS LLC		Member
	22.728	Trump Family Members		Member
Has ownership interest in :	various entities as indicated elsewhere in this schedule			

197 **_THC VENTURE III MEMBER CORP - N/K/A TTTT Venture Member Corp *(1)_**

Owned by :	% Ownership	Name		Role
	100	The Donald J. Trump Revocable Trust		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TTTT VENTURE LLC	1.00%	Managing Member	

198 **_THE CARIBUSINESS RE CORP *(1)_**

Owned by :	% Ownership	Name		Role
	100	DJT HOLDINGS MANAGING MEMBER LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	CARIBUSINESS MRE LLC	1.00%	Managing Member	
	Caribusiness Investments, S.R.L.	1.00%	Member	

199 **_The East 61 Street Company, LP_**

Owned by :	% Ownership	Name		Role
	99.9	The Donald J. Trump Revocable Trust		Partner
	0.1	Plaza Consulting Corp.		Partner

200 **_THE TRUMP CORPORATION_**

Owned by :	% Ownership	Name		Role
	100	The Donald J. Trump Revocable Trust		Shareholder

201 **_THE TRUMP ENTREPRENEUR INITIATIVE LLC *(5)_**

Owned by :	% Ownership	Name		Role

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	100	THE TRUMP ENTREPRENEUR INITIATIVE LLC (NY DOMESTIC)		Managing Member
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP EDUCATION ULC	100.00%	Shareholder	

202 ***THE TRUMP ENTREPRENEUR INITIATIVE LLC (NY DOMESTIC) *(5)***

Owned by :	**% Ownership**	**Name**		**Role**
	0.1	DJT ENTREPRENEUR MANAGING MEMBER LLC (FORMALLY KNOWN AS DJT UNIVERSITY MANAGING MEMBER LLC)		Managing Member
	3.5	Spitalny, Jonathan		Member
	4.5	Sexton, Michael		Member
	91.9	DJT ENTREPRENEUR MEMBER LLC (FORMALLY KNOWN AS DJT UNIVERSITY MEMBER LLC)		Member
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	THE TRUMP ENTREPRENEUR INITIATIVE LLC	100.00%	Managing Member	

203 ***THE TRUMP FOLLIES LLC *(3)***

Owned by :	**% Ownership**	**Name**		**Role**
	1	THE TRUMP FOLLIES MEMBER INC.		Managing Member
	99	DJT Holdings LLC		Member

204 ***THE TRUMP FOLLIES MEMBER INC. *(3)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	THE TRUMP FOLLIES LLC	1.00%	Managing Member	

205 ***The Trump Hotel Corp. *(3)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DJT Holdings Managing Member LLC		Shareholder

206 ***THE TRUMP MARKS REAL ESTATE CORP *(1)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP MARKS REAL ESTATE LLC	1.00%	Member	

207 ***The Trump Organization, Inc. *(3)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DJT Holdings Managing Member LLC		Shareholder

208 ***The Trump-Equitable Fifth Avenue Company***

Owned by :	**% Ownership**	**Name**		**Role**
	99	The Donald J. Trump Revocable Trust		Partner
	1	TIPPERARY REALTY CORPORATION		Partner
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	Fifty-Seventh Street Associates LLC	99.00%	Member	
	TRUMP TOWER COMMERCIAL LLC	99.00%	Member	

209 ***TIGL COMMON AREA MANAGEMENT CORP *(3)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DJT Holdings Managing Member LLC		Shareholder

211 ***TRUMP INTERNATIONAL GOLF LINKS - DOONBEG***

Owned by :	**% Ownership**	**Name**		**Role**
	100	TW VENTURE II LLC		Sole Member

212 ***TIGL IRELAND MANAGEMENT LIMITED *(assets & income already disclosed on Part 2 under TRUMP INTERNATIONAL GOLF LINKS - DOONBEG; operator of suites)***

Owned by :	% Ownership	Name		Role
	100	TRUMP INTERNATIONAL GOLF LINKS - DOONBEG		Sole Member

213 ***TIHC RESERVATIONS LLC *(3)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Member

214 ***TIHH MEMBER CORP *(1)***

Owned by :	% Ownership	Name		Role
	100	The Donald J. Trump Revocable Trust		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP INTERNATIONAL HOTEL HAWAII LLC	1.00%	Managing Member	

215 ***TIHH MEMBER LLC *(1)***

Owned by :	% Ownership	Name		Role
	100	The Donald J. Trump Revocable Trust		Managing Member
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP INTERNATIONAL HOTEL HAWAII LLC	99.00%	Member	

216 ***TIHM MEMBER CORP. *(1)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP INTERNATIONAL HOTELS MANAGEMENT LLC	0.10%	Managing Member	

217 ***TIHT CHICAGO MEMBER ACQUISITION LLC *(1)***

Owned by :	% Ownership	Name		Role
	100	DJT HOLDINGS LLC		Member
Has ownership interest in :	Entity Name	Ownership	Title	
	401 MEZZ VENTURE LLC	50.00%	Member	

218 ***TIHT COMMERCIAL LLC***

Owned by :	% Ownership	Name		Role
	0.01	TIHT MEMBER LLC		Member
	99.99	The Donald J. Trump Revocable Trust		Managing Member

219 ***TIHT HOLDING COMPANY LLC***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Member

220 ***TIHT MEMBER LLC *(1)***

Owned by :	% Ownership	Name		Role
	100	The Donald J. Trump Revocable Trust		Member
Has ownership interest in :	Entity Name	Ownership	Title	
	TIHT COMMERCIAL LLC	0.01%	Member	

221 ***TIPPERARY REALTY CORP. *(1)***

Owned by :	% Ownership	Name		Role
	100	The Donald J. Trump Revocable Trust		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	The Trump-Equitable Fifth Avenue Company	1.00%	Partner	

222 ***TMG Member, LLC *(1)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Member
Has ownership interest in :	Entity Name	Ownership	Title	

	Trump Model Management LLC	85.00%	Member

223 TRUMP NATIONAL GOLF CLUB - CHARLOTTE

Owned by :	% Ownership	Name		Role
	1	TNGC CHARLOTTE MANAGER CORP		Managing Member
	99	DJT HOLDINGS LLC		Member

224 TNGC CHARLOTTE MANAGER CORP *(1)

Owned by :	% Ownership	. Name		Role
	100	DJT HOLDINGS MANAGING MEMBER LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP NATIONAL GOLF CLUB - CHARLOTTE	1.00%	Managing Member	

225 TRUMP NATIONAL GOLF CLUB - HUDSON VALLEY

Owned by :	% Ownership	Name		Role
	1	TNGC DUTCHESS COUNTY MEMBER CORP		Managing Member
	99	DJT HOLDINGS LLC		Member

226 TNGC DUTCHESS COUNTY MEMBER CORP *(1)

Owned by :	% Ownership	Name		Role
	100	DJT HOLDINGS MANAGING MEMBER LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP NATIONAL GOLF CLUB - HUDSON VALLEY	1.00%	Managing Member	

227 TNGC JUPITER MANAGEMENT LLC

Owned by :	% Ownership	Name		Role
	1	TNGC JUPITER MANAGING MEMBER CORP		Managing Member
	99	DJT HOLDINGS LLC		Member

228 TNGC JUPITER MANAGING MEMBER CORP *(1)

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TNGC JUPITER MANAGEMENT LLC	1.00%	Managing Member	

229 TRUMP NATIONAL GOLF CLUB - PHILADELPHIA

Owned by :	% Ownership	Name		Role
	1	TNGC PINE HILL MEMBER CORP		Managing Member
	99	DJT HOLDINGS LLC		Member

230 TNGC PINE HILL MEMBER CORP *(1)

Owned by :	% Ownership	Name		Role
	100	DJT HOLDINGS MANAGING MEMBER LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP NATIONAL GOLF CLUB - PHILADELPHIA	1.00%	Managing Member	

231 Toronto Development LLC *(3)

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Member

234 TRUMP 106 CPS LLC

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Member

235 Trump 845 LP LLC *(1)

Owned by :	% Ownership	Name		Role
	100	The Donald J. Trump Revocable Trust		Managing Member
Has ownership interest in :	Entity Name	Ownership	Title	
	845 UN Limited Partnership	60.00%	Partner	

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236 TRUMP 845 UN GP LLC *(1)

Owned by :	% Ownership	Name		Role
	0.1	TRUMP 845 UN MGR CORP		Managing Member
	99.9	The Donald J. Trump Revocable Trust		Member
Has ownership interest in :	Entity Name	Ownership	Title	
	845 UN Limited Partnership	40.00%	Partner	

237 TRUMP 845 UN MGR CORP *(1)

Owned by :	% Ownership	Name		Role
	100	The Donald J. Trump Revocable Trust		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP 845 UN GP LLC	0.10%	Managing Member	

238 TRUMP 845 UN MGR LLC *(3)

Owned by :	% Ownership	Name		Role
	100	The Donald J. Trump Revocable Trust		Managing Member

239 TRUMP AC CASINO MARKS LLC *(3)

Owned by :	% Ownership	Name		Role
	1	TRUMP AC CASINO MARKS MEMBER CORP		Managing Member
	99	DTTM OPERATIONS LLC		Member

240 TRUMP AC CASINO MARKS MEMBER CORP *(3)

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP AC CASINO MARKS LLC	1.00%	Managing Member	

241 TRUMP ACQUISITION CORP. *(3)

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP ACQUISITION, LLC	1.00%	Managing Member	

242 TRUMP ACQUISITION, LLC *(3)

Owned by :	% Ownership	Name		Role
	1	TRUMP ACQUISITION CORP.		Managing Member
	99	DJT Holdings LLC		Member

243 TRUMP BOOKS LLC

Owned by :	% Ownership	Name		Role
	1	TRUMP BOOKS MANAGER CORP		Managing Member
	99	DJT Holdings LLC		Member

244 TRUMP BOOKS MANAGER CORP *(1)

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP BOOKS LLC	1.00%	Managing Member	

245 TRUMP BRAZIL LLC *(3)

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Member

246 TRUMP CANADIAN SERVICES, INC. *(3)

Owned by :	% Ownership	Name		Role
	100	The Donald J. Trump Revocable Trust		Shareholder

247 TRUMP CANOUAN ESTATE LLC *(5)

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Owned by :	% Ownership	Name	Role
	1	TRUMP CANOUAN ESTATE MEMBER CORP	Managing Member
	99	DJT Holdings LLC	Member

248 ***TRUMP CANOUAN ESTATE MEMBER CORP *(1)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	TRUMP CANOUAN ESTATE LLC	1.00%	Managing Member

249 ***TRUMP CARIBBEAN LLC *(3)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings LLC	Member

250 ***TRUMP CAROUSEL LLC***

Owned by :	% Ownership	Name	Role
	1	TRUMP CAROUSEL MEMBER CORP	Managing Member
	99	DJT Holdings LLC	Member

251 ***TRUMP CAROUSEL MEMBER CORP *(1)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	TRUMP CAROUSEL LLC	1.00%	Managing Member

252 ***TRUMP CENTRAL PARK WEST CORP *(3)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	One Central Park West Associates	50.00%	Partner

253 ***Trump Chicago Commercial Member Corp *(1)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	TRUMP CHICAGO COMMERCIAL MANAGER LLC	1.00%	Managing Member

254 ***TRUMP CHICAGO COMMERCIAL MANAGER LLC***

Owned by :	% Ownership	Name	Role
	1	Trump Chicago Commercial Member Corp	Managing Member
	99	DJT Holdings LLC	Member

255 ***TRUMP CHICAGO DEVELOPMENT LLC *(3)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings LLC	Member

256 ***TRUMP CHICAGO HOTEL MANAGER LLC***

Owned by :	% Ownership	Name	Role
	1	Trump Chicago Hotel Member Corp	Managing Member
	99	DJT Holdings LLC	Member

257 ***Trump Chicago Hotel Member Corp *(1)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	TRUMP CHICAGO HOTEL MANAGER LLC	1.00%	Managing Member

258 ***TRUMP CHICAGO MANAGING MEMBER LLC *(1)***

Owned by :	% Ownership	Name	Role
	100	DJT HOLDINGS LLC	Member

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Has ownership interest in :	Entity Name	Ownership	Title	
	401 MEZZ VENTURE LLC	1.00%	Member	

259 **TRUMP CHICAGO MEMBER LLC *(1)**

Owned by :	% Ownership	Name		Role
	100	DJT HOLDINGS LLC		Member
Has ownership interest in :	Entity Name	Ownership	Title	
	401 MEZZ VENTURE LLC	49.00%	Member	

260 **TRUMP CHICAGO RESIDENTIAL MANAGER LLC**

Owned by :	% Ownership	Name		Role
	1	Trump Chicago Residential Member Corp		Managing Member
	99	DJT Holdings LLC		Member

261 **Trump Chicago Residential Member Corp *(1)**

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP CHICAGO RESIDENTIAL MANAGER LLC	1.00%	Managing Member	

262 **TRUMP CHICAGO RETAIL LLC *(assets & income already disclosed on Part 2 under 401 North Wabash Venture LLC; operator of retail space)**

Owned by :	% Ownership	Name		Role
	100	401 MEZZ VENTURE LLC		Member

263 **TRUMP CHICAGO RETAIL MANAGER LLC *(3)**

Owned by :	% Ownership	Name		Role
	1	TRUMP CHICAGO RETAIL MEMBER CORP		Managing Member
	99	DJT Holdings LLC		Member

264 **TRUMP CHICAGO RETAIL MEMBER CORP *(3)**

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP CHICAGO RETAIL MANAGER LLC	1.00%	Managing Member	

267 **TRUMP COMMERCIAL CHICAGO LLC *(assets & income already disclosed on Part 2 under 401 North Wabash Venture LLC; operator of commercial space)**

Owned by :	% Ownership	Name		Role
	100	401 North Wabash Venture LLC		Member

268 **TRUMP CPS CORP *(1)**

Owned by :	% Ownership	Name		Role
	100	The Donald J. Trump Revocable Trust		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP CPS LLC	0.10%	Managing Member	

269 **TRUMP CPS LLC**

Owned by :	% Ownership	Name		Role
	0.1	TRUMP CPS CORP		Managing Member
	99.9	The Donald J. Trump Revocable Trust		Member

270 **TRUMP DELMONICO LLC *(1)**

Owned by :	% Ownership	Name		Role
	100	The Donald J. Trump Revocable Trust		Member
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP PARK AVENUE LLC	50.00%	Managing Member	

271 **TRUMP DEVELOPMENT SERVICES LLC**

Owned by :	% Ownership	Name		Role
	1	TRUMP DEVELOPMENT SERVICES MEMBER CORP		Managing Member
	99	DJT Holdings LLC		Member

272 **TRUMP DEVELOPMENT SERVICES MEMBER CORP *(1)**

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Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP DEVELOPMENT SERVICES LLC	1.00%	Managing Member	

275 ***TRUMP DRINKS ISRAEL LLC *(3)***

Owned by :	% Ownership	Name	Role
	1	TRUMP DRINKS ISRAEL MEMBER CORP	Managing Member
	99	DJT Holdings LLC	Member

276 ***TRUMP DRINKS ISRAEL MEMBER CORP *(3)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP DRINKS ISRAEL LLC	1.00%	Managing Member	

277 ***TRUMP EDUCATION ULC *(3)***

Owned by :	% Ownership	Name	Role
	100	THE TRUMP ENTREPRENEUR INITIATIVE LLC (NY DOMESTIC)	Shareholder

278 ***TRUMP EMPIRE STATE INC *(3)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder

279 ***TRUMP NATIONAL DORAL***

Owned by :	% Ownership	Name	Role
	1	TRUMP ENDEAVOR 12 MANAGER CORP	Managing Member
	99	DJT HOLDINGS LLC	Member

280 ***TRUMP ENDEAVOR 12 MANAGER CORP *(1)***

Owned by :	% Ownership	Name		Role
	100	DJT HOLDINGS MANAGING MEMBER LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP NATIONAL DORAL	1.00%	Managing Member	

281 ***TRUMP EU MARKS LLC *(3)***

Owned by :	% Ownership	Name	Role
	1	TRUMP EU MARKS MEMBER CORP	Managing Member
	99	DTTM OPERATIONS LLC	Member

282 ***TRUMP EU MARKS MEMBER CORP *(3)***

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP EU MARKS LLC	1.00%	Managing Member	

283 ***TRUMP FERRY POINT LLC***

Assumed Names :	D/B/A	Jurisdiction	
	Trump Golf Links Ferry Point	Delaware	
	Trump Golf Links Ferry Point	New York	
	Trump Golf Links	New York	
Owned by :	% Ownership	Name	Role
	1	TRUMP FERRY POINT MEMBER CORP	Managing Member
	99	DJT Holdings LLC	Member

284 ***TRUMP FERRY POINT MEMBER CORP *(1)***

Owned by :	% Ownership	Name		Role
	100	The Donald J. Trump Revocable Trust		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	

TRUMP FERRY POINT LLC	1.00%	Managing Member	

285 ***TRUMP FLORIDA MANAGEMENT LLC *(3)***

Owned by :	% Ownership	Name		Role
	1	TRUMP FLORIDA MANAGER CORP		Member
	99	DJT HOLDINGS LLC		Member

286 ***TRUMP FLORIDA MANAGER CORP *(3)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP FLORIDA MANAGEMENT LLC	1.00%	Member	

287 ***TRUMP GOLF ACQUISITIONS LLC***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Member

288 ***TRUMP GOLF COCO BEACH LLC *(4)***

Owned by :	% Ownership	Name		Role
	1	TRUMP GOLF COCO BEACH MEMBER CORP		Managing Member
	99	DJT Holdings LLC		Member

289 ***TRUMP GOLF COCO BEACH MEMBER CORP *(4)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP GOLF COCO BEACH LLC	1.00%	Managing Member	

290 ***TRUMP GOLF MANAGEMENT LLC *(3)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Member

291 ***TRUMP HOME MARKS LLC***

Owned by :	% Ownership	Name		Role
	1	TRUMP HOME MARKS MEMBER CORP		Managing Member
	99	DTTM OPERATIONS LLC		Member

292 ***TRUMP HOME MARKS MEMBER CORP *(1)***

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP HOME MARKS LLC	1.00%	Managing Member	

293 ***TRUMP ICE INC *(3)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Shareholder

294 ***TRUMP ICE LLC***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Member

295 ***TRUMP INTERNATIONAL DEVELOPMENT LLC *(3)***

Owned by :	% Ownership	Name		Role
	1	TRUMP INTERNATIONAL DEVELOPMENT MEMBER CORP		Managing Member
	99	DJT Holdings LLC		Member

296 ***TRUMP INTERNATIONAL DEVELOPMENT MEMBER CORP *(3)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP INTERNATIONAL DEVELOPMENT LLC	1.00%	Managing Member	

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297 *TRUMP INTERNATIONAL GOLF LINKS - SCOTLAND*

	% Ownership	Name		Role
Owned by :	99	DJT HOLDINGS MANAGING MEMBER LLC		Member
	1	TRUMP SCOTLAND MEMBER INC		Member

298 *Trump International Golf Club, Inc. *(1)*

	% Ownership	Name		Role
Owned by :	100	DJT HOLDINGS MANAGING MEMBER LLC		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP INTERNATIONAL GOLF CLUB - FLORIDA	0.001%	Member	

299 *TRUMP INTERNATIONAL GOLF CLUB - FLORIDA*

	% Ownership	Name		Role
Owned by :	0.001	Trump International Golf Club, Inc.		Member
	99.999	The Donald J. Trump Revocable Trust		Member

300 *TRUMP INTERNATIONAL HOTEL HAWAII LLC*

	% Ownership	Name		Role
Owned by :	1	TIHH MEMBER CORP		Managing Member
	99	TIHH MEMBER LLC		Member

301 *TRUMP INTERNATIONAL HOTELS MANAGEMENT LLC*

Assumed Names :	**D/B/A**	**Jurisdiction**		
	TRUMP HOTEL COLLECTION	Hawaii		
	TRUMP HOTEL COLLECTION	New York		
Owned by :	**% Ownership**	**Name**		**Role**
	0.1	TIHM MEMBER CORP.		Managing Member
	99.9	DJT Holdings LLC		Member
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	THC CHINA DEVELOPMENT LLC	100.00%	Member	
	THC IMEA DEVELOPMENT LLC	100.00%	Member	

303 *Trump Korea LLC *(3)*

	% Ownership	Name		Role
Owned by :	41	DAEWOO AMERICA DEVELOPMENT (NEW YORK) CORP		Member
	59	TRUMP KOREAN PROJECTS LLC		Member

304 *TRUMP KOREAN PROJECTS LLC *(3)*

	% Ownership	Name		Role
Owned by :	100	DJT Holdings LLC		Member
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	Trump Korea LLC	59.00%	Member	

305 *TRUMP LAS OLAS LLC *(3)*

	% Ownership	Name		Role
Owned by :	1	TRUMP LAS OLAS MEMBER CORP		Managing Member
	99	DJT Holdings LLC		Member

306 *TRUMP LAS OLAS MEMBER CORP *(3)*

	% Ownership	Name		Role
Owned by :	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP LAS OLAS LLC	1.00%	Managing Member	

307 *TRUMP LAS VEGAS CORP *(1)*

	% Ownership	Name		Role
Owned by :	100	DJT HOLDINGS MANAGING MEMBER LLC		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	

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	TRUMP LAS VEGAS MANAGING MEMBER LLC	6.00%	Managing Member	
	TRUMP LAS VEGAS MEMBER LLC	6.00%	Managing Member	

308 TRUMP LAS VEGAS DEVELOPMENT LLC

Owned by :	% Ownership	Name		Role
	100	DJT HOLDINGS LLC		Member

309 TRUMP LAS VEGAS MANAGING MEMBER LLC *(1)

Owned by :	% Ownership	Name		Role
	6	TRUMP LAS VEGAS CORP		Member
	94	DJT HOLDINGS LLC		Member
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP RUFFIN LLC	1.00%	Managing Member	

310 TRUMP LAS VEGAS MEMBER LLC *(1)

Owned by :	% Ownership	Name		Role
	6	TRUMP LAS VEGAS CORP		Member
	94	DJT HOLDINGS LLC		Managing Member
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP RUFFIN LLC	49.00%	Member	

311 Trump Las Vegas Sales & Marketing, Inc.

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder

312 TRUMP LAUDERDALE DEVELOPMENT LLC *(3)

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Member

313 TRUMP LAUDERDALE DEVELOPMENT NO 2 LLC *(4)

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Member

314 TRUMP MARKETING LLC *(4)

Owned by :	% Ownership	Name		Role
	100	DJT Holdings LLC		Member

315 TRUMP MARKS ASIA CORP *(1)

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS ASIA LLC	1.00%	Managing Member	

316 TRUMP MARKS ASIA LLC

Owned by :	% Ownership	Name		Role
	1	TRUMP MARKS ASIA CORP		Managing Member
	99	DJT HOLDINGS LLC		Member

317 TRUMP MARKS ATLANTA LLC *(3)

Owned by :	% Ownership	Name		Role
	1	TRUMP MARKS ATLANTA MEMBER CORP		Managing Member
	99	DTTM OPERATIONS LLC		Member

318 TRUMP MARKS ATLANTA MEMBER CORP *(3)

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS ATLANTA LLC	1.00%	Managing Member	

321 TRUMP MARKS BATUMI LLC *(3)

Owned by :	% Ownership	Name		Role
	1	TRUMP MARKS BATUMI MANAGING MEMBER CORP		Managing Member

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	99	DTTM OPERATIONS LLC		Member

322 TRUMP MARKS BATUMI MANAGING MEMBER CORP *(3)

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS BATUMI LLC	1.00%	Managing Member	

325 TRUMP MARKS CANOUAN CORP *(3)

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS CANOUAN LLC	1.00%	Managing Member	

326 TRUMP MARKS CANOUAN LLC *(3)

Owned by :	% Ownership	Name	Role
	1	TRUMP MARKS CANOUAN CORP	Managing Member
	99	DTTM OPERATIONS LLC	Member

327 TRUMP MARKS CHICAGO LLC *(3)

Owned by :	% Ownership	Name	Role
	1	TRUMP MARKS CHICAGO MEMBER CORP	Managing Member
	99	DTTM OPERATIONS LLC	Member

328 TRUMP MARKS CHICAGO MEMBER CORP *(3)

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS CHICAGO LLC	1.00%	Managing Member	

329 TRUMP MARKS DUBAI CORP *(3)

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS DUBAI LLC	1.00%	Managing Member	

330 TRUMP MARKS DUBAI LLC *(3)

Owned by :	% Ownership	Name	Role
	1	TRUMP MARKS DUBAI CORP	Managing Member
	99	DTTM OPERATIONS LLC	Member

333 TRUMP MARKS FINE FOODS LLC

Owned by :	% Ownership	Name	Role
	1	TRUMP MARKS FINE FOODS MEMBER CORP	Managing Member
	99	DTTM OPERATIONS LLC	Member

334 TRUMP MARKS FINE FOODS MEMBER CORP *(1)

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS FINE FOODS LLC	1.00%	Managing Member	

335 TRUMP MARKS FT LAUDERDALE LLC *(3)

Owned by :	% Ownership	Name	Role
	1	TRUMP MARKS FT LAUDERDALE MEMBER CORP	Managing Member
	99	DTTM OPERATIONS LLC	Member

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336 *TRUMP MARKS FT LAUDERDALE MEMBER CORP *(3)*

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS FT LAUDERDALE LLC	1.00%	Managing Member	

337 *TRUMP MARKS GP CORP *(1)*

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS HOLDINGS LP	1.00%	Partner	

338 *TRUMP MARKS HOLDINGS LP *(1)*

Owned by :	% Ownership	Name		Role
	1	TRUMP MARKS GP CORP		Partner
	99	DTTM Operations LLC		Partner
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS LLC	100.00%	Member	

339 *TRUMP MARKS HOLLYWOOD CORP *(3)*

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS HOLLYWOOD LLC	1.00%	Managing Member	

340 *TRUMP MARKS HOLLYWOOD LLC *(3)*

Owned by :	% Ownership	Name		Role
	1	TRUMP MARKS HOLLYWOOD CORP		Managing Member
	99	DTTM OPERATIONS LLC		Member

341 *TRUMP MARKS ISTANBUL II CORP *(1)*

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS INSTANBUL II LLC	1.00%	Managing Member	

342 *TRUMP MARKS ISTANBUL II LLC*

Owned by :	% Ownership	Name		Role
	1	TRUMP MARKS ISTANBUL II CORP		Managing Member
	99	DTTM OPERATIONS LLC		Member

343 *TRUMP MARKS JERSEY CITY CORP *(4)*

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS JERSEY CITY LLC	1.00%	Managing Member	

344 *TRUMP MARKS JERSEY CITY LLC *(4)*

Owned by :	% Ownership	Name		Role
	1	TRUMP MARKS JERSEY CITY CORP		Managing Member
	99	DTTM OPERATIONS LLC		Member

345 *TRUMP MARKS LAS VEGAS CORP *(3)*

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	

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TRUMP MARKS LAS VEGAS LLC	1.00%	Managing Member	

346 ***TRUMP MARKS LAS VEGAS LLC *(3)***

Owned by :	**% Ownership**	**Name**	**Role**
	1	TRUMP MARKS LAS VEGAS CORP	Managing Member
	99	DTTM OPERATIONS LLC	Member

347 ***TRUMP MARKS LLC *(4)***

Owned by :	**% Ownership**	**Name**	**Role**
	100	TRUMP MARKS HOLDINGS LP	Member

350 ***TRUMP MARKS MATTRESS LLC***

Owned by :	**% Ownership**	**Name**	**Role**
	1	TRUMP MARKS MATTRESS MEMBER CORP	Managing Member
	99	DTTM OPERATIONS LLC	Member

351 ***TRUMP MARKS MATTRESS MEMBER CORP *(1)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP MARKS MATTRESS LLC	1.00%	Managing Member	

352 ***TRUMP MARKS MENSWEAR LLC***

Owned by :	**% Ownership**	**Name**	**Role**
	1	TRUMP MARKS MENSWEAR MEMBER CORP	Managing Member
	99	DTTM OPERATIONS LLC	Member

353 ***TRUMP MARKS MENSWEAR MEMBER CORP *(1)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP MARKS MENSWEAR LLC	1.00%	Managing Member	

354 ***TRUMP MARKS MORTGAGE CORP *(3)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP MARKS MTG LLC	1.00%	Managing Member	

355 ***TRUMP MARKS MTG LLC *(3)***

Owned by :	**% Ownership**	**Name**	**Role**
	1	TRUMP MARKS MORTGAGE CORP	Managing Member
	99	DTTM OPERATIONS LLC	Member

356 ***TRUMP MARKS MUMBAI LLC *(3)***

Owned by :	**% Ownership**	**Name**	**Role**
	1	TRUMP MARKS MUMBAI MEMBER CORP	Managing Member
	99	DTTM OPERATIONS LLC	Member

357 ***TRUMP MARKS MUMBAI MEMBER CORP *(3)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP MARKS MUMBAI LLC	1.00%	Managing Member	

358 ***TRUMP MARKS NEW ROCHELLE CORP *(4)***

Reference #

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS NEW ROCHELLE LLC	1.00%	Managing Member	

359 *TRUMP MARKS NEW ROCHELLE LLC *(4)*

Owned by :	% Ownership	Name	Role
	1	TRUMP MARKS NEW ROCHELLE CORP	Managing Member
	99	DTTM OPERATIONS LLC	Member

360 *TRUMP MARKS PALM BEACH CORP *(3)*

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS PALM BEACH LLC	1.00%	Managing Member	

361 *TRUMP MARKS PALM BEACH LLC *(3)*

Owned by :	% Ownership	Name	Role
	1	TRUMP MARKS PALM BEACH CORP	Managing Member
	99	DTTM OPERATIONS LLC	Member

362 *TRUMP MARKS PANAMA CORP *(4)*

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS PANAMA LLC	1.00%	Managing Member	

363 *TRUMP MARKS PANAMA LLC *(4)*

Owned by :	% Ownership	Name	Role
	1	TRUMP MARKS PANAMA CORP	Managing Member
	99	DTTM OPERATIONS LLC	Member

364 *TRUMP MARKS PHILADELPHIA CORP *(3)*

Owned by :	% Ownership	Name		Role
	100	The Donald J. Trump Revocable Trust		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS PHILADELPHIA LLC	1.00%	Managing Member	

365 *TRUMP MARKS PHILADELPHIA LLC *(3)*

Owned by :	% Ownership	Name	Role
	1	TRUMP MARKS PHILADELPHIA CORP	Managing Member
	99	The Donald J. Trump Revocable Trust	Member

366 *TRUMP MARKS PHILIPPINES CORP *(1)*

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS PHILIPPINES LLC	1.00%	Managing Member	

367 *TRUMP MARKS PHILIPPINES LLC*

Owned by :	% Ownership	Name	Role
	1	TRUMP MARKS PHILIPPINES CORP	Managing Member
	99	DTTM OPERATIONS LLC	Member

368 *TRUMP MARKS PRODUCTS LLC *(4)*

Owned by :	% Ownership	Name	Role

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	1	TRUMP MARKS PRODUCTS MEMBER CORP		Managing Member
	99	DTTM OPERATIONS LLC		Member

369 ***TRUMP MARKS PRODUCTS MEMBER CORP *(4)***

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS PRODUCTS LLC	1.00%	Managing Member	

370 ***TRUMP MARKS PUERTO RICO I LLC *(3)***

Owned by :	% Ownership	Name		Role
	1	TRUMP MARKS PUERTO RICO I MEMBER CORP		Managing Member
	99	DTTM OPERATIONS LLC		Member

371 ***TRUMP MARKS PUERTO RICO I MEMBER CORP *(3)***

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS PUERTO RICO I LLC	1.00%	Managing Member	

374 ***TRUMP MARKS PUNTA DEL ESTE LLC***

Owned by :	% Ownership	Name		Role
	1	TRUMP MARKS PUNTA DEL ESTE MANAGER CORP		Managing Member
	99	DTTM OPERATIONS LLC		Member

375 ***TRUMP MARKS PUNTA DEL ESTE MANAGER CORP *(1)***

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS PUNTA DEL ESTE LLC	1.00%	Managing Member	

376 ***TRUMP MARKS REAL ESTATE LLC *(5)***

Owned by :	% Ownership	Name		Role
	1	THE TRUMP MARKS REAL ESTATE CORP		Member
	99	DTTM OPERATIONS LLC		Member

377 ***TRUMP MARKS SOHO LICENSE CORP *(4)***

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS SOHO LLC	1.00%	Member	

378 ***TRUMP MARKS SOHO LLC *(4)***

Owned by :	% Ownership	Name		Role
	1	TRUMP MARKS SOHO LICENSE CORP		Member
	99	DTTM OPERATIONS LLC		Member

379 ***TRUMP MARKS STAMFORD CORP *(4)***

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP MARKS STAMFORD LLC	1.00%	Member	

380 ***TRUMP MARKS STAMFORD LLC *(4)***

Owned by :	% Ownership	Name		Role
	99	DTTM OPERATIONS LLC		Member
	1	TRUMP MARKS STAMFORD CORP		Member

381 ***TRUMP MARKS SUNNY ISLES I LLC***

Owned by :	% Ownership	Name		Role
	1	TRUMP MARKS SUNNY ISLES I MEMBER CORP		Member

	99	DTTM OPERATIONS LLC		Member

382 ***TRUMP MARKS SUNNY ISLES I MEMBER CORP *(1)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP MARKS SUNNY ISLES I LLC	1.00%	Member	

383 ***TRUMP MARKS SUNNY ISLES II LLC *(4)***

Owned by :	**% Ownership**	**Name**	**Role**
	1	TRUMP MARKS SUNNY ISLES II MEMBER CORP	Member
	99	DTTM OPERATIONS LLC	Member

384 ***TRUMP MARKS SUNNY ISLES II MEMBER CORP *(4)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP MARKS SUNNY ISLES II LLC	1.00%	Member	

385 ***TRUMP MARKS TAMPA CORP *(3)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP MARKS TAMPA LLC	1.00%	Member	

386 ***TRUMP MARKS TAMPA LLC *(3)***

Owned by :	**% Ownership**	**Name**	**Role**
	1	TRUMP MARKS TAMPA CORP	Member
	99	DTTM OPERATIONS LLC	Member

387 ***TRUMP MARKS TORONTO CORP *(3)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP MARKS TORONTO LLC	1.00%	Member	

388 ***TRUMP MARKS TORONTO LLC *(3)***

Owned by :	**% Ownership**	**Name**	**Role**
	1	TRUMP MARKS TORONTO CORP	Member
	99	DTTM OPERATIONS LLC	Member

389 ***TRUMP MARKS TORONTO LP *(3)***

Owned by :	**% Ownership**	**Name**	**Role**
	1	TRUMP TORONTO MEMBER CORP	Member
	99	DTTM Operations LLC	Member

390 ***TRUMP MARKS WAIKIKI CORP *(1)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	The Donald J. Trump Revocable Trust		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP MARKS WAIKIKI LLC	1.00%	Managing Member	

391 ***TRUMP MARKS WAIKIKI LLC***

Owned by :	**% Ownership**	**Name**	**Role**
	1	TRUMP MARKS WAIKIKI CORP	Managing Member
	99	The Donald J. Trump Revocable Trust	Member

392 ***TRUMP MARKS WESTCHESTER CORP *(4)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	

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	TRUMP MARKS WESTCHESTER LLC	1.00%	Managing Member

393 *TRUMP MARKS WESTCHESTER LLC *(4)*

Owned by :	% Ownership	Name	Role
	1	TRUMP MARKS WESTCHESTER CORP	Managing Member
	99	DTTM OPERATIONS LLC	Member

394 *TRUMP MARKS WHITE PLAINS CORP *(4)*

Owned by :	% Ownership	Name	Role
	100	DTTM Operations Managing Member Corp	Shareholder
Has ownership interest in :	Entity Name	Ownership	Title
	TRUMP MARKS WHITE PLAINS LLC	1.00%	Managing Member

395 *TRUMP MARKS WHITE PLAINS LLC *(4)*

Owned by :	% Ownership	Name	Role
	1	TRUMP MARKS WHITE PLAINS CORP	Managing Member
	99	DTTM OPERATIONS LLC	Member

396 *TRUMP MIAMI RESORT MANAGEMENT LLC*

Owned by :	% Ownership	Name	Role
	1	TRUMP MIAMI RESORT MANAGEMENT MEMBER CORP	Managing Member
	99	DJT Holdings LLC	Member

397 *TRUMP MIAMI RESORT MANAGEMENT MEMBER CORP *(1)*

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder
Has ownership interest in :	Entity Name	Ownership	Title
	TRUMP MIAMI RESORT MANAGEMENT LLC	1.00%	Managing Member

398 *TRUMP MODEL MANAGEMENT LLC*

Assumed Names :	D/B/A	Jurisdiction	
	TRUMP MODELS	New York	
Owned by :	% Ownership	Name	Role
	15	Annie Veltri	Member
	85	TMG Member, LLC	Member

399 *TRUMP NATIONAL GOLF CLUB - COLTS NECK*

Owned by :	% Ownership	Name	Role
	1	TRUMP NATIONAL GOLF CLUB COLTS NECK MEMBER CORP	Managing Member
	99	DJT HOLDINGS LLC	Member

400 *TRUMP NATIONAL GOLF CLUB COLTS NECK MEMBER CORP *(1)*

Owned by :	% Ownership	Name	Role
	100	DJT HOLDINGS MANAGING MEMBER LLC	Shareholder
Has ownership interest in :	Entity Name	Ownership	Title
	TRUMP NATIONAL GOLF CLUB - COLTS NECK	1.00%	Managing Member

401 *TRUMP NATIONAL GOLF CLUB - WESTCHESTER*

Owned by :	% Ownership	Name	Role
	1	TRUMP NATIONAL GOLF CLUB MEMBER CORP	Managing Member
	99	DJT HOLDINGS LLC	Managing Member

402 *TRUMP NATIONAL GOLF CLUB MEMBER CORP *(1)*

Owned by :	% Ownership	Name	Role
	100	DJT HOLDINGS MANAGING MEMBER LLC	Shareholder
Has ownership interest in :	Entity Name	Ownership	Title
	TRUMP NATIONAL GOLF CLUB - WESTCHESTER	1.00%	Managing Member

403 *TRUMP NATIONAL GOLF CLUB - WASHINGTON DC*

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Owned by :	**% Ownership**	**Name**		**Role**
	1	TRUMP NATIONAL GOLF CLUB WASHINGTON DC MEMBER CORP		Managing Member
	99	DJT HOLDINGS LLC		Member

404 ***TRUMP NATIONAL GOLF CLUB WASHINGTON DC MEMBER CORP *(1)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DJT HOLDINGS MANAGING MEMBER LLC		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP NATIONAL GOLF CLUB - WASHINGTON DC	1.00%	Managing Member	

405 ***Trump New World Property Management, LLC *(3)***

Owned by :	**% Ownership**	**Name**		**Role**
	50	New World Property Management Limited		Managing Member
	50	TRUMP RIVERSIDE MANAGEMENT LLC		Managing Member

408 ***TRUMP OLD POST OFFICE LLC***

Owned by :	**% Ownership**	**Name**		**Role**
	1	TRUMP OLD POST OFFICE MEMBER CORP		Managing Member
	76.725	DJT HOLDINGS LLC		Member
	22.275	Trump Family Members		Member

409 ***TRUMP OLD POST OFFICE MEMBER CORP *(1)***

Owned by :	**% Ownership**	**Name**		**Role**
	77.5	DJT HOLDINGS MANAGING MEMBER LLC		Shareholder
	22.5	Trump Family Members		
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP OLD POST OFFICE LLC	1.00%	Managing Member	

411 ***TRUMP ORGANIZATION LLC *(3)***

Assumed Names :	**D/B/A**	**Jurisdiction**		
	The Trump Organization	New York		
Owned by :	**% Ownership**	**Name**		**Role**
	100	DJT Holdings LLC		Member

412 ***TRUMP PAGEANTS, INC. *(1)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	Miss Universe L.P., LLLP	2.00%	Partner	

413 ***Miss Universe L.P., LLLP***

Owned by :	**% Ownership**	**Name**		**Role**
	2	TRUMP PAGEANTS, INC.		Partner
	98	DJT Holdings LLC		Partner

414 ***TRUMP PALACE/PARC LLC***

Owned by :	**% Ownership**	**Name**		**Role**
	0.1	FIRST MEMBER INC		Managing Member
	99.9	The Donald J. Trump Revocable Trust		Member

415 ***TRUMP PANAMA CONDOMINIUM MANAGEMENT LLC *(3)***

Owned by :	**% Ownership**	**Name**		**Role**
	1	TRUMP PANAMA CONDOMINIUM MEMBER CORP		Managing Member
	99	DJT Holdings LLC		Member

416 ***TRUMP PANAMA CONDOMINIUM MEMBER CORP *(3)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP PANAMA CONDOMINIUM MANAGEMENT LLC	1.00%	Managing Member	

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417 TRUMP PANAMA HOTEL MANAGEMENT LLC

	% Ownership	Name	Role
Owned by :	1	TRUMP PANAMA HOTEL MANAGEMENT MEMBER CORP	Managing Member
	99	DJT Holdings LLC	Member

418 TRUMP PANAMA HOTEL MANAGEMENT MEMBER CORP *(1)

	% Ownership	Name	Role
Owned by :	100	DJT Holdings Managing Member LLC	Shareholder

	Entity Name	Ownership	Title
Has ownership interest in :	TRUMP PANAMA HOTEL MANAGEMENT LLC	1.00%	Managing Member

419 TRUMP PARK AVENUE ACQUISITION LLC *(1)

	% Ownership	Name	Role
Owned by :	100	The Donald J. Trump Revocable Trust	Member

	Entity Name	Ownership	Title
Has ownership interest in :	TRUMP PARK AVENUE LLC	49.90%	Member

420 TRUMP PARK AVENUE LLC

	% Ownership	Name	Role
Owned by :	0.1	GEPT Delmonico LLC	Member
	49.9	TRUMP PARK AVENUE ACQUISITION LLC	Member
	50	TRUMP DELMONICO LLC	Managing Member

421 TRUMP PAYROLL CHICAGO LLC *(2)

	% Ownership	Name	Role
Owned by :	100	401 North Wabash Venture LLC	Managing Member

422 TRUMP PAYROLL CORP *(2)

	% Ownership	Name	Role
Owned by :	100	DJT Holdings Managing Member LLC	Shareholder

423 TRUMP PHOENIX DEVELOPMENT LLC *(3)

	% Ownership	Name	Role
Owned by :	100	DJT Holdings LLC	Shareholder

424 TRUMP PLAZA LLC

	% Ownership	Name	Role
Owned by :	1	TRUMP PLAZA MEMBER INC.	Managing Member
	99	The Donald J. Trump Revocable Trust	Member

425 TRUMP PLAZA MEMBER INC. *(1)

	% Ownership	Name	Role
Owned by :	100	The Donald J. Trump Revocable Trust	Shareholder

	Entity Name	Ownership	Title
Has ownership interest in :	TRUMP PLAZA LLC	1.00%	Managing Member

426 TRUMP PRODUCTIONS LLC

	% Ownership	Name	Role
Owned by :	1	TRUMP PRODUCTIONS MANAGING MEMBER INC.	Managing Member
	99	DJT Holdings LLC	Member

427 TRUMP PRODUCTIONS MANAGING MEMBER INC. *(1)

	% Ownership	Name	Role
Owned by :	100	DJT Holdings Managing Member LLC	Shareholder

	Entity Name	Ownership	Title
Has ownership interest in :	TRUMP PRODUCTIONS LLC	1.00%	Managing Member

429 TRUMP REALTY SERVICES LLC *(5)

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Owned by :	**% Ownership**	**Name**		**Role**
	100	DJT Holdings LLC		Member

430 ***Trump Restaurants LLC***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DJT Holdings LLC		Member

431 ***TRUMP RIVERSIDE MANAGEMENT LLC *(3)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DJT Holdings LLC		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	Trump New World Property Management, LLC	50.00%	Managing Member	

432 ***TRUMP RUFFIN COMMERCIAL LLC *(assets & income already disclosed on Part 2 under TRUMP RUFFIN TOWER I LLC; operator of front desk)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	TRUMP RUFFIN TOWER I LLC		Managing Member

433 ***TRUMP RUFFIN LLC *(1)***

Owned by :	**% Ownership**	**Name**		**Role**
	1	TRUMP LAS VEGAS MANAGING MEMBER LLC		Managing Member
	49	TRUMP LAS VEGAS MEMBER LLC		Member
	50	Hyde Park, LLC		Member
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP RUFFIN TOWER I LLC	100.00%	Managing Member	

434 ***TRUMP RUFFIN TOWER I LLC***

Owned by :	**% Ownership**	**Name**		**Role**
	100	TRUMP RUFFIN LLC		Managing Member
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP RUFFIN COMMERCIAL LLC	100.00%	Managing Member	

435 ***TRUMP SALES & LEASING CHICAGO LLC *(5)***

Owned by :	**% Ownership**	**Name**		**Role**
	1	TRUMP SALES & LEASING CHICAGO MEMBER CORP		Member
	99	DJT Holdings LLC		Member

436 ***TRUMP SALES & LEASING CHICAGO MEMBER CORP *(1)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP SALES & LEASING CHICAGO LLC	1.00%	Member	

437 ***TRUMP SCOTLAND MEMBER INC. *(1)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP INTERNATIONAL GOLF LINKS - SCOTLAND	1.00%	Member	

438 ***TRUMP SCOTSBOROUGH SQUARE LLC***

Owned by :	**% Ownership**	**Name**		**Role**
	1	TRUMP SCOTSBOROUGH SQUARE MEMBER CORP.		Managing Member
	99	DJT HOLDINGS LLC		Member

439 ***TRUMP SCOTSBOROUGH SQUARE MEMBER CORP. *(1)***

Owned by :	**% Ownership**	**Name**		**Role**
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	TRUMP SCOTSBOROUGH SQUARE LLC	1.00%	Managing Member	

440 ***TRUMP SOHO MEMBER LLC *(3)***

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Owned by :	% Ownership	Name	Role
	100	DJT Holdings LLC	Member

441 ***TRUMP TORONTO DEVELOPMENT, INC. *(4)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder

442 ***TRUMP TORONTO HOTEL MANAGEMENT CORP***

Owned by :	% Ownership	Name	Role
	100	DJT HOLDINGS MANAGING MEMBER LLC	Shareholder

443 ***TRUMP TORONTO MEMBER CORP *(3)***

Owned by :	% Ownership	Name	Role
	100	DTTM Operations Managing Member Corp	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	TRUMP MARKS TORONTO LP	1.00%	Member

444 ***TRUMP TOWER COMMERCIAL LLC***

Owned by :	% Ownership	Name	Role
	1	TRUMP TOWER MANAGING MEMBER INC.	Managing Member
	99	The Trump-Equitable Fifth Avenue Company	Member

445 ***TRUMP TOWER MANAGING MEMBER INC.***

Owned by :	% Ownership	Name	Role
	100	The Donald J. Trump Revocable Trust	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	TRUMP TOWER COMMERCIAL LLC	1.00%	Managing Member

446 ***Trump Village Construction Corp. *(1)***

Owned by :	% Ownership	Name	Role
	25	The Donald J. Trump Revocable Trust	Shareholder
	75	Trump Family Members	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	Starrett City Associates, L.P.	1.84%	Partner
	Spring Creek Plaza LLC	1.84%	Member

447 ***TRUMP VINEYARD ESTATES LLC***

Owned by :	% Ownership	Name	Role
	1	TRUMP VINEYARD ESTATES MANAGER CORP	Managing Member
	99	DJT HOLDINGS LLC	Member

Has ownership interest in :	Entity Name	Ownership	Title
	TRUMP VINEYARD ESTATES LOT 3 OWNER LLC	100.00%	Member

448 ***TRUMP VINEYARD ESTATES LOT 3 OWNER LLC***

Owned by :	% Ownership	Name	Role
	100	TRUMP VINEYARD ESTATES LLC	Member

449 ***TRUMP VINEYARD ESTATES MANAGER CORP *(1)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	TRUMP VINEYARD ESTATES LLC	1.00%	Managing Member

450 ***TRUMP VIRGINIA ACQUISITIONS LLC***

Owned by :	% Ownership	Name	Role
	1	TRUMP VIRGINIA ACQUISITIONS MANAGER CORP	Managing Member
	99	DJT Holdings LLC	Member

451 ***TRUMP VIRGINIA ACQUISITIONS MANAGER CORP *(1)***

Owned by :	% Ownership	Name	Role

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	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	**Entity Name** TRUMP VIRGINIA ACQUISITIONS LLC	**Ownership** 1.00%	**Title** Managing Member	

452 ***TRUMP VIRGINIA LOT 5 LLC***

Owned by :	**% Ownership**	**Name**		**Role**
	1	TRUMP VIRGINIA LOT 5 MANAGER CORP		Managing Member
	99	DJT HOLDINGS LLC		Member

453 ***TRUMP VIRGINIA LOT 5 MANAGER CORP *(1)***

Owned by :	**% Ownership** 100	**Name** DJT Holdings Managing Member LLC		**Role** Shareholder
Has ownership interest in :	**Entity Name** TRUMP VIRGINIA LOT 5 LLC	**Ownership** 1.00%	**Title** Managing Member	

454 ***TRUMP WINE MARKS LLC *(3)***

Owned by :	**% Ownership**	**Name**		**Role**
	1	TRUMP WINE MARKS MEMBER CORP		Managing Member
	99	DJT HOLDINGS LLC		Member

455 ***TRUMP WINE MARKS MEMBER CORP *(3)***

Owned by :	**% Ownership** 100	**Name** DTTM Operations Managing Member Corp		**Role** Shareholder
Has ownership interest in :	**Entity Name** TRUMP WINE MARKS LLC	**Ownership** 1.00%	**Title** Managing Member	

456 ***TRUMP WORLD PRODUCTIONS LLC *(4)***

Owned by :	**% Ownership**	**Name**		**Role**
	1	TRUMP WORLD PRODUCTIONS MANAGER CORP		Managing Member
	99	DJT HOLDINGS LLC		Member

457 ***TRUMP WORLD PRODUCTIONS MANAGER CORP *(4)***

Owned by :	**% Ownership** 100	**Name** DJT Holdings Managing Member LLC		**Role** Shareholder
Has ownership interest in :	**Entity Name** TRUMP WORLD PRODUCTIONS LLC	**Ownership** 1.00%	**Title** Managing Member	

458 ***TRUMP WORLD PUBLICATIONS LLC *(3)***

Owned by :	**% Ownership** 100	**Name** DJT Holdings LLC		**Role** Member

459 ***TRUMP'S CASTLE MANAGEMENT CORP *(3)***

Owned by :	**% Ownership** 100	**Name** The Donald J. Trump Revocable Trust		**Role** Shareholder

460 ***TURNBERRY SCOTLAND LLC***

Owned by :	**% Ownership**	**Name**		**Role**

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	1	TURNBERRY SCOTLAND MANAGING MEMBER CORP		Managing Member
	99	DJT HOLDINGS LLC		Member
Has ownership interest in :	Entity Name	Ownership	Title	
	Golf Recreation Scotland Limited	100.00%	Sole Member	

461 TURNBERRY SCOTLAND MANAGING MEMBER CORP *(1)

Owned by :	% Ownership	Name		Role
	100	DJT HOLDINGS MANAGING MEMBER LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TURNBERRY SCOTLAND LLC	1.00%	Managing Member	

462 TW VENTURE I LLC

Owned by :	% Ownership	Name		Role
	1	TW VENTURE I MANAGING MEMBER CORP		Managing Member
	99	DJT HOLDINGS LLC		Member

463 TW VENTURE I MANAGING MEMBER CORP *(1)

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TW VENTURE I LLC	1.00%	Managing Member	

464 TW VENTURE II LLC

Owned by :	% Ownership	Name		Role
	1	TW VENTURE II MANAGING MEMBER CORP		Managing Member
	99	DJT HOLDINGS LLC		Member
Has ownership interest in :	Entity Name	Ownership	Title	
	TRUMP INTERNATIONAL GOLF LINKS - DOONBEG	100.00%	Shareholder	

465 TW VENTURE II MANAGING MEMBER CORP *(1)

Owned by :	% Ownership	Name		Role
	100	DJT HOLDINGS MANAGING MEMBER LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	TW VENTURE II LLC	1.00%	Managing Member	

466 ULTIMATE AIR CORP. *(3)

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder

467 UNIT 2502 ENTERPRISES CORP *(1)

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	UNIT 2502 ENTERPRISES LLC	1.00%	Managing Member	

468 UNIT 2502 ENTERPRISES LLC *(5)

Owned by :	% Ownership	Name		Role
	1	UNIT 2502 ENTERPRISES CORP		Managing Member
	99	DJT HOLDINGS LLC		Member

469 TRUMP NATIONAL GOLF CLUB - LOS ANGELES

Owned by :	% Ownership	Name		Role
	100	RPV DEVELOPMENT LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	VHPS LLC	100.00%	Managing Member	

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470 **VHPS LLC *(assets & income already disclosed on Part 2 under TRUMP NATIONAL GOLF CLUB - LOS ANGELES; owner of vacant land)**

	% Ownership	Name		Role
Owned by :	100	TRUMP NATIONAL GOLF CLUB - LOS ANGELES		Managing Member

471 **WEST PALM OPERATIONS LLC *(5)**

	% Ownership	Name		Role
Owned by :	100	DJT Holdings LLC		Member

472 **Wexford Hall Inc. *(3)**

	% Ownership	Name		Role
Owned by :	25	The Donald J. Trump Revocable Trust		Shareholder
	75	Trump Family Members		Shareholder

473 **WHITE COURSE LLC *(5)**

	% Ownership	Name		Role
Owned by :	1	WHITE COURSE MANAGING MEMBER CORP		Managing Member
	99	DJT HOLDINGS LLC		Member

474 **WHITE COURSE MANAGING MEMBER CORP *(1)**

	% Ownership	Name		Role
Owned by :	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	WHITE COURSE LLC	1.00%	Managing Member	

475 **Wilshire Hall LLC *(3)**

	% Ownership	Name		Role
Owned by :	25	DJT Holdings LLC		Member
	75	Trump Family Members		Member

476 **Wollman Rink Operations LLC**

	% Ownership	Name		Role
Owned by :	100	DJT Holdings LLC		Member

477 **YORKTOWN REAL ESTATE LLC (F/K/A Yorktown Development Associates LLC) *(3)**

	% Ownership	Name		Role
Owned by :	100	DJT Holdings LLC		Member

478 **HWA 555 Owners, LLC**

	% Ownership	Name		Role
Owned by :	100	Hudson Waterfront Associates I, L.P.		Partner

479 **1290 AVENUE OF THE AMERICAS, A TENANCY-IN-COMMON**

	% Ownership	Name		Role
Owned by :	52	HWA 1290 III LLC		Partner
	20.2	HWA 1290 IV LLC		Partner
	27.8	HWA 1290 V LLC		Partner

480 **Trump Management Inc.**

	% Ownership	Name		Role
Owned by :	25	The Donald J. Trump Revocable Trust		Shareholder
	75	Trump Family Members		Shareholder

481 **HWA 1290 III LLC *(1)**

	% Ownership	Name		Role
Owned by :	100	Hudson Waterfront Associates III, L.P.		Partner
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	1290 Avenue of the Americas	52.00%	Partner	

482 **HWA 1290 IV LLC *(1)**

	% Ownership	Name		Role
Owned by :	100	Hudson Waterfront Associates IV, L.P.		Partner
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	1290 Avenue of the Americas	20.20%	Partner	

483 ***HWA 1290 V LLC *(1)***

Owned by :	% Ownership	Name		Role
	100	Hudson Waterfront Associates V, L.P.		Partner
Has ownership interest in :	Entity Name	Ownership	Title	
	1290 Avenue of the Americas	27.80%	Partner	

486 ***Travel Enterprises Management Inc. *(5)***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings Managing Member LLC	Shareholder

490 ***The Donald J. Trump Company LLC *(3)***

Owned by :	% Ownership	Name	Role
	100	The Donald J. Trump Revocable Trust	Member

493 ***DT BALI GOLF MANAGER LLC *(4)***

Owned by :	% Ownership	Name	Role
	1	DT BALI GOLF MANAGER MEMBER CORP	Managing Member
	99	TTTT VENTURE LLC	Member

494 ***DT BALI GOLF MANAGER MEMBER CORP *(4)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	DT BALI GOLF MANAGER	1.00%	Managing Member	

495 ***DT BALI HOTEL MANAGER LLC *(4)***

Owned by :	% Ownership	Name	Role
	1	DT BALI HOTEL MANAGER MEMBER CORP	Managing Member
	99	TTTT VENTURE LLC	Member

496 ***DT BALI HOTEL MANAGER MEMBER CORP *(4)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	DT BALI HOTEL MANAGER LLC	1.00%	Managing Member	

497 ***DT BALI TECHNICAL SERVICES MANAGER LLC***

Owned by :	% Ownership	Name	Role
	1	DT BALI TECHNICAL SERVICES MANAGER MEMBER CORP	Managing Member
	99	TTTT VENTURE LLC	Member

498 ***DT BALI TECHNICAL SERVICES MANAGER MEMBER CORP *(1)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	DT BALI TECHINICAL SERVICES MANAGER LLC	1.00%	Managing Member	

499 ***DT CONNECT EUROPE LIMITED***

Owned by :	% Ownership	Name	Role
	100	Golf Recreation Scotland Limited	Partner

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500 ***DT ENDEAVOR I LLC***

Owned by :	% Ownership	Name	Role
	100	The Donald J. Trump Revocable Trust	Member

505 ***DT LIDO GOLF MANAGER LLC *(4)***

Owned by :	% Ownership	Name	Role
	1	DT LIDO GOLF MANAGER MEMBER CORP	Managing Member
	99	TTTT VENTURE LLC	Member

506 ***DT LIDO GOLF MANAGER MEMBER CORP *(4)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	DT LIDO GOLF MANAGER LLC	1.00%	Managing Member	

507 ***DT LIDO HOTEL MANAGER LLC *(4)***

Owned by :	% Ownership	Name	Role
	1	DT LIDO HOTEL MANAGER MEMBER CORP	Managing Member
	99	TTTT VENTURE LLC	Member

508 ***DT LIDO HOTEL MANAGER MEMBER CORP *(4)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	DT LIDO HOTEL MANAGER LLC	1.00%	Managing Member	

509 ***DT LIDO TECHNICAL SERVICES MANAGER LLC***

Owned by :	% Ownership	Name	Role
	1	DT LIDO TECHNICAL SERVICES MANAGER MEMBER CORP	Managing Member
	99	TTTT VENTURE LLC	Member

510 ***DT LIDO TECHNICAL SERVICES MANAGER MEMBER CORP *(1)***

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	DT LIDO TECHNICAL SERVICES MANAGER LLC	1.00%	Managing Member	

511 ***DT MARKS BALI LLC *(4)***

Owned by :	% Ownership	Name	Role
	1	DT MARKS BALI MEMBER CORP	Managing Member
	99	DTTM OPERATIONS LLC	Member

512 ***DT MARKS BALI MEMBER CORP *(4)***

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	DT MARKS BALI LLC	1.00%	Managing Member	

513 ***DT MARKS LIDO LLC *(4)***

Owned by :	% Ownership	Name	Role
	1	DT MARKS LIDO MEMBER CORP	Managing Member
	99	DTTM OPERATIONS LLC	Member

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Reference #

514 *DT MARKS LIDO MEMBER CORP *(4)*

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	DT MARKS LIDO LLC	1.00%	Managing Member	

515 *DT TOWER I LLC *(4)*

Owned by :	% Ownership	Name		Role
	1	DT TOWER I MEMBER CORP		Managing Member
	99	DJT Holdings LLC		Member

516 *DT TOWER I MEMBER CORP *(4)*

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	DT TOWER I LLC	1.00%	Managing Member	

517 *DT TOWER KOLKATA LLC*

Owned by :	% Ownership	Name		Role
	1	DT TOWER KOLKATA MANAGING MEMBER CORP		Managing Member
	99	DTTM OPERATIONS LLC		Member

518 *DT TOWER KOLKATA MANAGING MEMBER CORP *(1)*

Owned by :	% Ownership	Name		Role
	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	DT TOWER KOLKATA LLC	1.00%	Member	

519 *DTTM OPERATIONS LLC*

Owned by :	% Ownership	Name		Role
	1	DTTM OPERATIONS MANAGING MEMBER CORP		Managing Member
	99	DJT Holdings LLC		Member
Has ownership interest in :	various entities as indicated elsewhere in this schedule			

520 *DTTM OPERATIONS MANAGING MEMBER CORP *(1)*

Owned by :	% Ownership	Name		Role
	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	various entities as indicated elsewhere in this schedule			

521 *EID VENTURE II LLC *(2)*

Owned by :	% Ownership	Name		Role
	1	EID VENTURE II MEMBER CORP		Managing Member
	99	The Donald J. Trump Revocable Trust		Member

522 *EID VENTURE II MEMBER CORP *(2)*

Owned by :	% Ownership	Name		Role
	100	The Donald J. Trump Revocable Trust		Shareholder
Has ownership interest in :	Entity Name	Ownership	Title	
	EID VENTURE II LLC	1.00%	Managing Member	

523 *MOBILE PAYROLL CONSTRUCTION LLC*

	% Ownership	Name		Role
Owned by :	1	MOBILE PAYROLL CONSTRUCTION MANAGER CORP		Managing Member
	99	DJT Holdings LLC		Member

524 ***MOBILE PAYROLL CONSTRUCTION MANAGER CORP *(1)***

	% Ownership	Name		Role
Owned by :	100	DJT Holdings Managing Member LLC		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	MOBILE PAYROLL CONSTRUCTION LLC	1.00%	Managing Member	

525 ***THC DC RESTAURANT HOSPITALITY LLC *(1)***

	% Ownership	Name	Role
Owned by :	100	OPO HOTEL MANAGER LLC	Member

530 ***C DEVELOPMENT VENTURES LLC *(3)***

	% Ownership	Name	Role
Owned by :	1	C DEVELOPMENT VENTURES MEMBER CORP	Managing Member
	99	DTTM OPERATIONS LLC	Member

531 ***C DEVELOPMENT VENTURES MEMBER CORP *(3)***

	% Ownership	Name		Role
Owned by :	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	C DEVELOPMENT VENTURES LLC	1.00%	Managing Member	

533 ***DT VENTURE I LLC***

	% Ownership	Name	Role
Owned by :	100	DJT Holdings LLC	Member

534 ***DT VENTURE I MEMBER CORP *(3)***

	% Ownership	Name	Role
Owned by :	100	DTTM Operations Managing Member Corp	Shareholder

535 ***DT VENTURE II LLC *(5)***

	% Ownership	Name	Role
Owned by :	100	DJT Holdings LLC	Member

536 ***DT VENTURE II MEMBER CORP *(3)***

	% Ownership	Name	Role
Owned by :	100	DTTM Operations Managing Member Corp	Shareholder

537 ***DT TOWER II LLC *(4)***

	% Ownership	Name	Role
Owned by :	1	DTTM Operations LLC	Member
	99	DT TOWER II MEMBER CORP	Managing Member

538 ***DT TOWER II MEMBER CORP *(4)***

	% Ownership	Name		Role
Owned by :	100	DTTM Operations Managing Member Corp		Shareholder
Has ownership interest in :	**Entity Name**	**Ownership**	**Title**	
	DT TOWER II LLC	99.00%	Managing Member	

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539 ***DT ENDEAVOR I MEMBER CORP *(3)***

	% Ownership	Name	Role
Owned by :	100	DTTM Operations Managing Member Corp	Shareholder

540 ***4T HOLDINGS ONE LLC *(3)***

	% Ownership	Name	Role
Owned by :	100	TTTT VENTURE LLC	Member

541 ***4T HOLDINGS TWO LLC***

	% Ownership	Name	Role
Owned by :	100	TTTT VENTURE LLC	Member

	Entity Name	Ownership	Title
Has ownership interest in :	SC CLEVELAND MS MANAGEMENT LLC	100.00%	Member
	SC PIER VILLAGE MANAGEMENT LLC	100.00%	Member

542 ***STORAGE 106 LLC***

	% Ownership	Name	Role
Owned by :	100	The Donald J. Trump Revocable Trust	Member

543 ***T EXPRESS LLC***

	% Ownership	Name	Role
Owned by :	1	T EXPRESS MANAGER MEMBER CORP	Managing Member
	99	TTTT VENTURE LLC	Member

544 ***T EXPRESS MANAGER MEMBER CORP *(1)***

	% Ownership	Name	Role
Owned by :	100	DJT HOLDINGS MANAGING MEMBER LLC	Shareholder

	Entity Name	Ownership	Title
Has ownership interest in :	T EXPRESS LLC	1.00%	Managing Member

545 ***SC CLEVELAND MS MANAGEMENT LLC***

	% Ownership	Name	Role
Owned by :	100	4T HOLDINGS TWO LLC	Member

546 ***SC PIER VILLAGE MANAGEMENT LLC *(3)***

	% Ownership	Name	Role
Owned by :	100	4T HOLDINGS TWO LLC	Member

547 ***T PROMOTIONS LLC***

	% Ownership	Name	Role
Owned by :	100	DTTM OPERATIONS LLC	Member

548 ***T RETAIL LLC***

	% Ownership	Name	Role
Owned by :	0.5	T RETAIL MANAGING MEMBER CORP	Managing Member
	0.5	DTTM OPERATIONS LLC	Member
	99	TTTT VENTURE LLC	Member

549 ***T RETAIL MANAGING MEMBER CORP *(1)***

	% Ownership	Name	Role
Owned by :	100	DJT HOLDINGS MANAGING MEMBER LLC	Sole Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	T RETAIL LLC	0.50%	Managing Member

550 ***WESTMINSTER HOTEL MANAGEMENT LLC***

Owned by :	% Ownership	Name	Role
	76.725	DJT HOLDINGS LLC	Member
	22.275	TTT CONSULTING LLC	Member
	1	WESTMINSTER HOTEL MANAGER MEMBER CORP	Managing Member

551 ***WESTMINSTER HOTEL MANAGER MEMBER CORP *(1)***

Owned by :	% Ownership	Name	Role
	77.5	The Donald J. Trump Revocable Trust	Shareholder
	22.5	TTT CONSULTING LLC	Shareholder

Has ownership interest in :	Entity Name	Ownership	Title
	WESTMINSTER HOTEL MANAGEMENT LLC	1.00%	Managing Member

552 ***1125 South Ocean LLC***

Owned by :	% Ownership	Name	Role
	100	DJT Holdings LLC	Sole Member

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Sent: 6/29/2019 12:03:59 PM
To: jeevacation@gmail.com
Subject: 2020 Democratic debates and major Supreme Court rulings

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From: Paul Morris [[redacted]]
Sent: 7/2/2019 4:24:45 PM
To: jeevacation@gmail.com
Subject: Capital Market Outlook

Capital Market Outlook
Chief Investment Office

Capital Market Outlook from our Chief Investment Office delivers a balanced mix of macroeconomic insights and global market views, with in-depth analysis from the CIO's investment strategists and analysts. It offers timely commentary that can help you navigate markets and take advantage of emerging trends across the globe.

This week's topics are:

- ***Macro Strategy:* Why 2%?** — While Federal Reserve policy has always been focused on the goal of price stability, the specific meaning of price stability has been refined over the years from a general and non-specified, vague concept to the current very specific quantitative definition of a 2% long-run average for the personal consumption expenditures deflator. We describe the evolution and rationale for the more specific target.
- ***Global Market View:* Global R&D: From Apollo, to Apple, to Alibaba?** — The recent unfolding tech cold war between the U.S. and China will likely only accelerate the pace of spending on global research and development as the two parties vie for technological supremacy. China faces significant technological hurdles, while the U.S. needs to rethink and rebalance the role of public and private sector research and development spending.
- ***Thought of the Week:* A Golden Diversifier** — Gold's recent outperformance versus the U.S. dollar has potentially triggered a bullish technical pattern. In our

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view, the market's expectation for looser monetary policy together with recent comments by President Trump implying a desire for a weaker greenback have been tailwinds. In addition to these drivers, we view gold as an appealing diversifier in light of elevated geopolitical risks. However, a comprehensive trade deal between the U.S. and China would likely constitute a more significant headwind for the yellow metal.

Find out more in this edition of **Capital Market Outlook**, and feel free to contact us with any questions you have about our market views.

Sincerely,
Paul

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Penguin
Press

National Pub date: February 19, 2019
Title: *DEEP THINKING*
Subtitle: *Twenty-Five Ways of Looking at AI*
By: John Brockman
Length: 90,000 words

Headline: Science world luminary John Brockman assembles twenty-five of the most important scientific minds, people who have been thinking about the field artificial intelligence for most of their careers for an unparalleled round-table examination about mind, thinking, intelligence and what it means to be human.

Description:

"Artificial intelligence is today's story—the story behind all other stories. It is the Second Coming and the Apocalypse at the same time: Good AI versus evil AI." —John Brockman

More than sixty years ago, mathematician-philosopher Norbert Wiener published a book on the place of machines in society that ended with a warning: "we shall never receive the right answers to our questions unless we ask the right questions…. The hour is very late, and the choice of good and evil knocks at our door."

In the wake of advances in unsupervised, self-improving machine learning, a small but influential community of thinkers is considering Wiener's words again. In *Deep Thinking*, John Brockman gathers their disparate visions of where AI might be taking us.

The fruit of the long history of Brockman's profound engagement with the most important scientific minds who have been thinking about AI—from Alison Gopnik and David Deutsch to Frank Wilczek and Stephen Wolfram— *Deep Thinking* is an ideal introduction to the landscape of crucial issues AI presents.

The collision between opposing perspectives is salutary and exhilarating; some of these figures, such as computer scientist Stuart Russell, Skype co-founder Jaan Tallinn, and physicist Max Tegmark, are deeply concerned with the threat of AI, including the existential one, while others, notably robotics entrepreneur Rodney Brooks, philosopher Daniel Dennett, and bestselling author Steven Pinker, have a very different view. Serious, searching and authoritative, *Deep Thinking* lays out the intellectual landscape of one of the most important topics of our time.

Participants in The Deep Thinking Project

Chris Anderson is an entrepreneur; a roboticist; former editor-in-chief of *Wired*; co-founder and CEO of 3DR; and author of *The Long Tail, Free,* and *Makers.*

Rodney Brooks is a computer scientist; Panasonic Professor of Robotics, emeritus, MIT; former director, MIT Computer Science Lab; and founder, chairman, and CTO of Rethink Robotics. He is the author of *Flesh and Machines.*

George M. Church is Robert Winthrop Professor of Genetics at Harvard Medical School; Professor of Health Sciences and Technology, Harvard-MIT; and co-author (with Ed Regis) of *Regenesis: How Synthetic Biology Will Reinvent Nature and Ourselves.*

Daniel C. Dennett is University Professor and Austin B. Fletcher Professor of Philosophy and director of the Center for Cognitive Studies at Tufts University. He is the author of a dozen books, including *Consciousness Explained* and, most recently, From *Bacteria to Bach and Back: The Evolution of Minds.*

David Deutsch is a quantum physicist and a member of the Centre for Quantum Computation at the Clarendon Laboratory, Oxford University. He is the author of *The Fabric of Reality* and *The Beginning of Infinity.*

Anca Dragan is an assistant professor in the Department of Electrical Engineering and Computer Sciences at UC Berkeley. She co-founded and serves on the steering committee for the Berkeley AI Research (BAIR) Lab and is a co-principal investigator in Berkeley's Center for Human-Compatible AI.

George Dyson is a historian of science and technology and the author of *Baidarka: the Kayak, Darwin Among the Machines, Project Orion,* and *Turing's Cathedral.*

Peter Galison is a science historian, Joseph Pellegrino University Professor and co-founder of
the Black Hole Initiative at Harvard University, and the author of *Einstein's Clocks and Poincaré's Maps: Empires of Time.*

Neil Gershenfeld is a physicist and director of MIT's Center for Bits and Atoms. He is the author of *FAB*, co-author (with Alan Gershenfeld & Joel Cutcher-Gershenfeld) of *Designing Reality*, and founder of the global fab lab network.

Alison Gopnik is a developmental psychologist at UC Berkeley; her books include The Philosophical Baby and, most recently, *The Gardener and the Carpenter: What the New Science of Child Development Tells Us About the Relationship Between Parents and Children.*

Tom Griffiths is Henry R. Luce Professor of Information, Technology, Consciousness, and Culture at Princeton University. He is co-author (with Brian Christian) of *Algorithms to Live By.*

W. Daniel "Danny" Hillis is an inventor, entrepreneur, and computer scientist, Judge Widney Professor of Engineering and Medicine at USC, and author of *The Pattern on the Stone: The Simple Ideas That Make Computers Work.*

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Deep Thinking
Twenty-five Ways of Looking at AI

edited by John Brockma

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Introduction: On the Promise and Peril of AI

John Brockman

Artificial intelligence is today's story—the story behind all other stories. It is the Second Coming and the Apocalypse at the same time: Good AI versus evil AI. This book comes out of an ongoing conversation with a number of important thinkers, both in the world of AI and beyond it, about what AI is and what it means. Called the Deep Thinking Project, this conversation began in earnest in September 2016, in a meeting at the Mayflower Grace Hotel in Washington, Connecticut with some of the book's contributors.

What quickly emerged from that first meeting is that the excitement and fear in the wider culture surrounding AI now has an analogue in the way Norbert Wiener's ideas regarding "cybernetics" worked their way through the culture, particularly in the 1960's, as artists began to incorporate thinking about new technologies into their work. I witnessed the impact of those ideas at close hand; indeed it's not too much to say they set me off on my life's path. With the advent of the digital era beginning in the early 1970s, people stopped talking about Wiener, but today, his Cybernetic Idea has been so widely adopted that it's internalized to the point where it no longer needs a name. It's everywhere, it's in the air, and it's a fitting a place to begin.

New Technologies=New Perceptions

Before AI, there was Cybernetics—the idea of automatic, self-regulating control, laid out in Norbert Wiener's foundational text of 1948. I can date my own serious exposure to it to 1966, when the composer John Cage invited me and four or five other young arts people to join him for a series of dinners—an ongoing seminar about media, communications, art, music, and philosophy that focused on Cage's interest in the ideas of Wiener, Claude Shannon, and Marshall McLuhan, all of whom had currency in the New York art circles in which I was then moving. In particular, Cage had picked up on McLuhan's idea that by inventing electronic technologies we had externalized our central nervous system—that is, our minds—and that we now had to presume that "there's only one mind, the one we all share."

Ideas of this nature were beginning to be of great interest to the artists I was working with in New York at the Film-Makers' Cinémathèque, where I was program manager for a series of multimedia productions called the New Cinema 1 (also known as the Expanded Cinema Festival), under the auspices of avant-garde filmmaker and impresario Jonas Mekas. They included visual artists Claes Oldenburg, Robert Rauschenberg, Andy Warhol, Robert Whitman; kinetic artists Charlotte Moorman and Nam June Paik; happenings artists Allan Kaprow and Carolee Schneemann; dancer Tricia Brown; filmmakers Jack Smith, Stan Vanderbeek, Ed Emshwiller, and the Kuchar brothers; avant-garde dramatist Ken Dewey; poet Gerd Stern and the USCO group; minimalist musicians Lamonte Young and Terry Riley; and through Warhol, the music group, The Velvet Underground. Many of these people were reading Wiener, and cybernetics was in the air. It was at one of these dinners that Cage reached into his briefcase and took out a copy of *Cybernetics* and handed it to me, saying, "This is for you."

During the Festival, I received an unexpected phone call from Wiener's colleague Arthur K. Solomon, head of Harvard's graduate program in biophysics. Wiener had died the year before, and Solomon and Wiener's other close colleagues at MIT and Harvard had been reading about the Expanded Cinema Festival in the *New York Times* and were intrigued by the connection to Wiener's work. Solomon invited me to bring some of the artists up to Cambridge to meet with him and a group that included MIT sensory-communications researcher Walter Rosenblith, Harvard applied mathematician Anthony Oettinger, and MIT engineer Harold "Doc" Edgerton, inventor of the strobe light.

Like many other "art meets science" situations I've been involved in since, the two-day event was an informed failure: ships passing in the night. But I took it all onboard and the event was consequential in some interesting ways—one of which came from the fact that they took us to see "the" computer. Computers were a rarity back then; at least, none of us on the visit had ever seen one. We were ushered into a large space on the MIT campus, in the middle of which there was a "cold room" raised off the floor and enclosed in glass, in which technicians wearing white lab coats, scarves, and gloves were busy collating punch cards coming through an enormous machine. When I approached, the steam from my breath fogged up the window into the cold room. Wiping it off, I saw "the" computer. I fell in love.

Later, in the Fall of 1967, I went to Menlo Park to spend time with Stewart Brand, whom I had met in New York in 1965 when he was a satellite member of the USCO group of artists. Now, with his wife Lois, a mathematician, he was preparing the first edition of *The Whole Earth Catalog* for publication. While Lois and the team did the heavy lifting on the final mechanicals for WEC, Stewart and I sat together in a corner for two days, reading, underlining, and annotating the same paperback copy of *Cybernetics* that Cage had handed to me the year before, and debating Wiener's ideas.

Inspired by this set of ideas, I began to develop a theme, a mantra of sorts, that has informed my endeavors since: "new technologies = new perceptions." Inspired by communications theorist Marshall McLuhan, architect-designer Buckminster Fuller, futurist John McHale, and cultural anthropologists Edward T. (Ned) Hall and Edmund Carpenter, I started reading avidly in the field of information theory, cybernetics, and systems theory. McLuhan suggested I read biologist J.Z. Young's *Doubt and Certainty in Science* in which he said that we create tools and we mold ourselves through our use of them. The other text he recommended was Warren Weaver and Claude Shannon's 1949 paper "Recent Contributions to the Mathematical Theory of Communication," which begins: "The word *communication* will be used here in a very broad sense to include all of the procedures by which one mind may affect another. This, of course, involves not only written and oral speech, but also music, the pictorial arts, the theater, the ballet, and in fact all human behavior."

Who knew that within two decades of that moment we would begin to recognize the brain as a computer? And in the next two decades, as we built our computers into the Internet, that we would begin to realize that the brain is not a computer, but a network of computers? Certainly not Wiener, a specialist in analogue feedback circuits designed to control machines, nor the artists, nor, least of all, myself.

"We must cease to kiss the whip that lashes us."

Two years after *Cybernetics,* in 1950, Norbert Wiener published *The Human Use of Human Beings*—a deeper story, in which he expressed his concerns about the runaway commercial exploitation and other unforeseen consequences of the new technologies of control. I didn't read *The Human Use of Human Beings* until the spring of 2016, when I picked up my copy, a first edition, which was sitting in my library next to *Cybernetics.* What shocked me was the realization of just how prescient Wiener was in 1950 about what's going on today. Although the first edition was a major bestseller—and, indeed, jump-started an important conversation—under pressure from his peers Wiener brought out a revised and milder edition in 1954, from which the original concluding chapter, "Voices of Rigidity," is conspicuously absent.

Science historian George Dyson points out that in this long-forgotten first edition, Wiener predicted the possibility of a "threatening new Fascism dependent on the *machine à gouverner*":

> No elite escaped his criticism, from the Marxists and the Jesuits ("all of Catholicism is indeed essentially a totalitarian religion") to the FBI ("our great merchant princes have looked upon the propaganda technique of the Russians, and have found that it is good") and the financiers lending their support "to make American capitalism and the fifth freedom of the businessman supreme throughout the world." Scientists . . . received the same scrutiny given the Church: "Indeed, the heads of great laboratories are very much like Bishops, with their association with the powerful in all walks of life, and the dangers they incur of the carnal sins of pride and of lust for power."

This jeremiad did not go well for Wiener. As Dyson puts it:

> These alarms were discounted at the time, not because Wiener was wrong about digital computing but because larger threats were looming as he completed his manuscript in the fall of 1949. Wiener had nothing against digital computing but was strongly opposed to nuclear weapons and refused to join those who were building digital computers to move forward on the thousand-times-more-powerful hydrogen bomb.

Since the original of *The Human Use of Human Beings* is now out of print, lost to us is Wiener's *cri de coeur*, more relevant today than when he wrote it, sixty-eight years ago: "We must cease to kiss the whip that lashes us."

Mind, Thinking, Intelligence

Among the reasons we don't hear much about "Cybernetics" today, two are central: First, although *The Human Use of Human Beings* was considered an important book in its time, it ran counter to the aspirations of many of Wiener's colleagues, including John von Neumann and Claude Shannon, who were interested in the commercialization of the new technologies. Second, computer pioneer John McCarthy disliked Wiener and refused to use Wiener's term "Cybernetics." McCarthy, in turn, coined the term "artificial intelligence" and became a founding father of that field.

As Judea Pearl, who, in the 1980s, introduced a new approach to artificial intelligence called Bayesian networks, explained to me:

> What Wiener created was excitement to believe that one day we are going to make an intelligent machine. He wasn't a computer scientist. He talked feedback, he talked communication, he talked analog. His working metaphor was a feedback circuit, which he was an expert in. By the time the digital age began in the early 1960s people wanted to talk programming, talk codes, talk about computational functions, talk about short-term memory, long-term memory—meaningful computer metaphors. Wiener wasn't part of that, and he didn't reach the new generation that germinated with his ideas. His metaphors were too old, *passé*. There were new means already available that were ready to capture the human imagination." By 1970, people were no longer talking about Wiener.

One critical factor missing in Wiener's vision was the cognitive element: mind, thinking, intelligence. As early as 1942, at the first of a series of foundational interdisciplinary meetings about the control of complex systems that would come to be known as the Macy conferences, leading researchers were arguing for the inclusion of the cognitive element into the conversation. While von Neumann, Shannon, and Wiener were concerned about systems of control and communication of observed systems, Warren McCullough wanted to include mind. He turned to cultural anthropologists Gregory Bateson and Margaret Mead to make the connection to the social sciences. Bateson in particular was increasingly talking about patterns and processes, or "the pattern that connects." He called for a new kind of systems ecology in which organisms and the environment in which they live are one in the same, and should be considered as a single circuit. By the early 1970s the Cybernetics of observed systems—1st order Cybernetics—moved to the Cybernetics of observing systems—2nd order Cybernetics—or "the Cybernetics of Cybernetics", as coined by Heinz von Foerster, who joined the Macy conferences in the mid 1950s, and spearheaded the new movement.

Cybernetics, rather than disappearing, was becoming metabolized into *everything*, so we no longer saw it as a separate, distinct new discipline. And there it remains, hiding in plain sight.

"The Shtick of the Steins"

My own writing about these issues at the time was on the radar screen of the 2nd order Cybernetics crowd, including Heinz von Foerster as well as John Lilly and Alan Watts, who were the co-organizers of something called "The AUM Conference," shorthand for "The American University of Masters", which took place in Big Sur in 1973, a gathering of philosophers, psychologists, and scientists, each of whom asked to lecture on his own work in terms of its relationship to the ideas of British mathematician G. Spencer Brown presented in his book, *Laws of Form*.

I was a bit puzzled when I received an invitation—a very late invitation indeed—which they explained was based on their interest in the ideas I presented in a book called *Afterwords*, which were very much on their wavelength. I jumped at the opportunity, the main reason being that the keynote speaker was none other than Richard Feynman. I love to spend time with physicists, the reason being that they think about the universe, i.e. everything. And no physicist was reputed to be articulate as Feynman. I couldn't wait to meet him. I accepted. That said, I am not a scientist, and I had never entertained the idea of getting on a stage and delivering a "lecture" of any kind, least of all a commentary on an obscure mathematical theory in front of a group identified as the world's most interesting thinkers. Only upon my arrival in Big Sur did I find out the reason for my very late invitation. "When is Feynman's talk?" I asked at the desk. "Oh, didn't Alan Watts tell you? Richard is ill and has been hospitalized. You're his replacement. And, by the way, what's the title of your keynote lecture?"

I tried to make myself invisible for several days. Alan Watts, realizing that I was avoiding the podium, woke me up one night with a 3am knock on the door of my room. I opened the door to find him standing in front of me wearing a monk's robe with a hood that covering much of his face. His arms extended, he held a lantern in one hand, and a magnum of scotch on the other.

"John", he said in a deep voice with a rich aristocratic British accent, "you are a phony." "And, John", he continued, I am a phony. But John, I am a *real* phony!"

The next day I gave my lecture, entitled "Einstein, Gertrude Stein, Wittgenstein, and Frankenstein." Einstein: the revolution in 20th century physics; Gertrude Stein: the first writer who made integral to her work the idea of an indeterminate and discontinuous universe. Words represented neither character nor activity: A rose is a rose is a rose, and a universe is a universe is a universe.); Wittgenstein: the world as limits of language. "The limits of my language mean the limits of my world". The end of the distinction between observer and observed. Frankenstein: Cybernetics AI, robotics, all the essayists in this volume.

The lecture had unanticipated consequences. Among the participants at the AUM Conference were several authors of #1 New York Times bestsellers, yet no one there had a literary agent. And I realized that all were engaged in writing a genre of book both unnamed and unrecognized by New York publishers. Since I had an MBA from Colombia Business School, and a series of relative successes in business, I was dragooned into becoming an agent, initially for Gregory Bateson and John Lilly, whose books I sold quickly, and for sums that caught my attention, thus kick-starting my career as a literary agent.

I never did meet Richard Feynman.

The Long AI Winters

This new career put me in close touch with most of the AI pioneers, and over the decades I rode with them on waves of enthusiasm, and into valleys of disappointment.

In the early '80s the Japanese government mounted a national effort to advance AI. They called it the 5th Generation; their goal was to change the architecture of computation by breaking "the von Neumann bottleneck", by creating a massively parallel computer. In so doing, they hoped to jumpstart their economy and become a dominant world power in the field. In1983, the leader of the Japanese 5th Generation consortium came to New York for a meeting organized by Heinz Pagels, the president of the New York Academy of Sciences. I had a seat at the table alongside the leaders of the 1st generation, Marvin Minsky and John McCarthy, the 2nd generation, Edward Feigenbaum and Roger Schank, and Joseph Traub, head of the National Supercomputer Consortium.

In 1981 with Heinz's help, I had founded "The Reality Club" (the precursor to the non-profit Edge.org), whose initial interdisciplinary meetings took place in the Board Room at the NYAS. Heinz was working on his book, *Dreams of Reason: The Rise of the Science of Complexity*, which he considered to be a research agenda for science in the 1990's.

Through the Reality Club meetings, I got to know two young researchers who were about to play key roles in revolutionizing computer science. At MIT in the late seventies, Danny Hillis developed the algorithms that made possible the massively parallel computer. In 1983, his company, Thinking Machines, built the world's fastest supercomputer by utilizing parallel architecture. His "connection machine," closely reflected the workings of the human mind. Seth Lloyd at Rockefeller University was undertaking seminal work in the fields of quantum computation and quantum communications, including proposing the first technologically feasible design for a quantum computer.

And the Japanese? Their foray into artificial intelligence failed, and was followed by twenty years of anemic economic growth. But, the leading US scientists took this program very seriously. And Feigenbaum, who was the cutting-edge computer scientist of the day, teamed up with McCorduck to write a book on these developments. *The Fifth Generation: Artificial Intelligence and Japan's Computer Challenge to the World* was published in 1983. We had a code name for the project: "It's coming, it's coming!" But it didn't come; it went.

From that point on I've worked with researchers in nearly every variety of AI and complexity, including Rodney Brooks, Hans Moravec, John Archibald Wheeler, Benoit Mandelbrot, John Henry Holland, Danny Hillis, Freeman Dyson, Chris Langton, Doyne Farmer, Geoffrey West, Stuart Russell, and Judea Pearl.

An Ongoing Dynamical Emergent System

From the initial meeting in Washington, CT to the present, I arranged a number of dinners and discussions in London and Cambridge, Massachusetts, as well as a public event at London's City Hall. Among the attendees were distinguished scientists, science historians, and communications theorists, all of whom have been thinking seriously about AI issues for their entire careers.

I commissioned essays from a wide range of contributors, with or without references to Wiener (leaving it up to each participant). In the end, 25 people wrote essays, all individuals concerned about what is happening today in the age of AI. *Deep Thinking* in not *my* book, rather it is *our* book: Seth Lloyd, Judea Pearl, Stuart Russell, George Dyson, Daniel C. Dennett, Rodney Brooks, Frank Wilczek, Max Tegmark, Jaan Tallinn, Steven Pinker, David Deutsch, Tom Griffiths, Anca Dragan, Chris Anderson, David Kaiser, Neil Gershenfeld, W. Daniel Hillis, Venki Ramakrishnan, Alex "Sandy" Pentland, Hans Ulrich Obrist, Alison Gopnik, Peter Galison, George M. Church, Caroline A. Jones, Stephen Wolfram.

I see The Deep Thinking Project as an ongoing dynamical emergent system, a presentation of the ideas of a community of sophisticated thinkers who are bringing their experience and erudition to bear in challenging the prevailing digital AI narrative as they communicate their thoughts to one another. The aim is to present a mosaic of views which will help make sense out of this rapidly emerging field.

I asked the essayists to consider:

(a) The Zen-like poem "Thirteen Ways of Looking at a Blackbird," by Wallace Stevens, which he insisted was "not meant to be a collection of epigrams or of ideas, but of sensations." It is an exercise in "perspectivism," consisting of short, separate sections, each of which mentions blackbirds in some way. The poem is about his own imagination; it concerns what he attends to.

(b) The parable of the blind men and an elephant. Like the elephant, AI is too big a topic for any one perspective, never mind the fact that no two people seem to see things the same way.

What do we want the book to do? Stewart Brand has noted that "revisiting pioneer thinking is perpetually useful. And it gives a long perspective that invites thinking in decades and centuries about the subject. All contemporary discussion, is bound to age badly and immediately without the longer perspective."

Danny Hillis wants people in AI to realize how they've been programmed by Wiener's book. "You're executing its road map," he says, and you just don't realize it."

Dan Dennett would like to "let Wiener emerge as the ghost at the banquet. Think of it as a source of hybrid vigor, a source of unsettling ideas to shake uŒp the established mindset."

Neil Gershenfeld argues that "stealth remedial education for the people running the "Big Five" would be a great output from the book."

Freeman Dyson Freeman, one of the few people alive who knew Wiener, notes that "*The* Human *Use of Human Beings* is one of the best books ever written. Wiener got almost everything right. I will be interested to see what your bunch of wizards will do with it."

The Evolving AI Narrative

Things have changed—and they remain the same. Now AI is everywhere. We have the Internet. We have our smartphones. The founders of the dominant companies—the companies that hold "the whip that lashes us"—have net worths of $65 billion, $90 billion, $130 billion. High-profile individuals such as Elon Musk, Nick Bostrom, Martin Rees, Eliezer Yudkowsky, and the late Stephen Hawking have issued dire warnings about AI, resulting in the ascendancy of well-funded institutes tasked with promoting "Nice AI." But will we, as a species, be able to control a fully realized, unsupervised, self-improving AI? Wiener's warnings and admonitions in *The Human Use of Human Beings* are now very real, and they need to be looked at anew by researchers at the forefront of the AI revolution. Here is Dyson again:

> Wiener became increasingly disenchanted with the "gadget worshipers" whose corporate selfishness brought "motives to automatization that go beyond a legitimate curiosity and are sinful in themselves." He knew the danger was not machines becoming more like humans but humans being treated like machines. "The world of the future will be an ever more demanding struggle against the limitations of our intelligence," he warned in *God & Golem, Inc.*, published in

> 1964, the year of his death, "not a comfortable hammock in which we can lie down to be waited upon by our robot slaves."

It's time to examine the evolving AI narrative by identifying the leading members of that mainstream community along with the dissidents, and presenting their counternarratives in their own voices.

The essays that follow thus constitute a much-needed update from the field.

John Brockman
New York, 2019

I met **Seth Lloyd** *in the late 1980s, when new ways of thinking were everywhere: the importance of biological organizing principles, the computational view of mathematics and physical processes, the emphasis on parallel networks, the importance of nonlinear dynamics, the new understanding of chaos, connectionist ideas, neural networks, and parallel distributive processing. The advances in computation during that period provided us with a new way of thinking about knowledge.*

Seth likes to refer to himself as a quantum mechanic. He is internationally known for his work in the field of quantum computation, which attempts to harness the exotic properties of quantum theory, like superposition and entanglement, to solve problems that would take several lifetimes to solve on classical computers.

In the essay that follows, he traces the history of information theory from Norbert Wiener's prophetic insights to the predictions of a technological "singularity" that some would have us believe will supplant the human species. His takeaway on the recent programming method known as deep learning is to call for a more modest set of expectations; he notes that despite AI's enormous advances, robots "still can't tie their own shoes."

It's difficult for me to talk about Seth without referencing his relationship with his friend and professor, the late theoretical physicist Heinz Pagels of Rockefeller University. The graduate student and the professor each had a profound effect on each other's ideas.

In the summer of 1988, I visited Heinz and Seth at the Aspen Center for Physics. Their joint work on the subject of complexity was featured in the current issue of Scientific American*; they were ebullient. That was just two weeks before Heinz's tragic death in a hiking accident while descending Pyramid Peak with Seth. They were talking about quantum computing.*

WRONG, BUT MORE RELEVANT THAN EVER

Seth Lloyd

Seth Lloyd *is a theoretical physicist at MIT, Nam P. Suh Professor in the Department of Mechanical Engineering, and an external professor at the Santa Fe Institute.*

The Human Use of Human Beings, Norbert Wiener's 1950 popularization of his highly influential book *Cybernetics: Control and Communication in the Animal and the Machine* (1948)*,* investigates the interplay between human beings and machines in a world in which machines are becoming ever more computationally capable and powerful. It is a remarkably prescient book, and remarkably wrong. Written at the height of the Cold War, it contains a chilling reminder of the dangers of totalitarian organizations and societies, and of the danger to democracy when it tries to combat totalitarianism with totalitarianism's own weapons.

Wiener's *Cybernetics* looked in close scientific detail at the process of control via feedback. ("Cybernetics," from the ancient Greek for "helmsman," is the etymological basis of our word "governor," which is what James Watt called his pathbreaking feedback control device that transformed the use of steam engines.) Because he was immersed in problems of control, Wiener saw the world as a set of complex, interlocking feedback loops, in which sensors, signals, and actuators such as engines interact via an intricate exchange of signals and information. The engineering applications of *Cybernetics* were tremendously influential and effective, giving rise to rockets, robots, automated assembly lines, and a host of precision-engineering techniques—in other words, to the basis of contemporary industrial society.

Wiener had greater ambitions for cybernetic concepts, however, and in *The Human Use of Human Beings* he spells out his thoughts on its application to topics as diverse as Maxwell's Demon, human language, the brain, insect metabolism, the legal system, the role of technological innovation in government, and religion. These broader applications of cybernetics were an almost unequivocal failure. Vigorously hyped from the late 1940s to the early 1960s—to a degree similar to the hype of computer and communication technology that led to the dotcom crash of 2000-2001—cybernetics delivered satellites and telephone switching systems but generated few if any useful developments in social organization and society at large.

Nearly seventy years later, however, *The Human Use of Human Beings* has more to teach us humans than it did the first time around. Perhaps the most remarkable feature of the book is that it introduces a large number of topics concerning human/machine interactions that are still of considerable relevance. Dark in tone, the book makes several predictions about disasters to come in the second half of the 20th century, many of which are almost identical to predictions made today about the second half of the 21st.

For example, Wiener foresaw a moment in the near future of 1950 in which humans would cede control of society to a cybernetic artificial intelligence, which would then proceed to wreak havoc on humankind. The automation of manufacturing, Wiener predicted, would both create large advances in productivity and displace many workers from their jobs—a sequence of events that did indeed come to pass in the ensuing decades. Unless society could find productive occupations for these displaced workers, Wiener warned, revolt would ensue.

But Wiener failed to foresee crucial technological developments. Like pretty much all technologists of the 1950s, he failed to predict the computer revolution. Computers, he thought, would eventually fall in price from hundreds of thousands of (1950s) dollars to tens of thousands; neither he nor his compeers anticipated the tremendous explosion of computer power that would follow the development of the transistor and the integrated circuit. Finally, because of his emphasis on control, Wiener could not foresee a technological world in which innovation and self-organization bubble up from the bottom rather than being imposed from the top.

Focusing on the evils of totalitarianism (political, scientific, and religious), Wiener saw the world in a deeply pessimistic light. His book warned of the catastrophe that awaited us if we didn't mend our ways, fast. The current world of human beings and machines, more than a half century after its publication, is much more complex, richer, and contains a much wider variety of political, social, and scientific systems than he was able to envisage. The warnings of what will happen if we get it wrong, however—for example, control of the entire Internet by a global totalitarian regime—remain as relevant and pressing today as they were in 1950.

What Wiener Got Right

Wiener's most famous mathematical works focused on problems of signal analysis and the effects of noise. During World War II, he developed techniques for aiming anti-aircraft fire by making models that could predict the future trajectory of an airplane by extrapolating from its past behavior. In *Cybernetics* and in *The Human Use of Human Beings*, Wiener notes that this past behavior includes quirks and habits of the human pilot, thus a mechanized device can predict the behavior of humans. Like Alan Turing, whose Turing Test suggested that computing machines could give responses to questions which were indistinguishable from human responses, Wiener was fascinated by the notion of capturing human behavior by mathematical description. In the 1940s, he applied his knowledge of control and feedback loops to neuro-muscular feedback in living systems, and was responsible for bringing Warren McCulloch and Walter Pitts to MIT, where they did their pioneering work on artificial neural networks.

Wiener's central insight was that the world should be understood in terms of information. Complex systems, such as organisms, brains, and human societies, consist of interlocking feedback loops in which signals exchanged between subsystems result in complex but stable behavior. When feedback loops break down, the system goes unstable. He constructed a compelling picture of how complex biological systems function, a picture that is by and large universally accepted today.

Wiener's vision of information as the central quantity in governing the behavior of complex systems was remarkable at the time. Nowadays, when cars and refrigerators are jammed with microprocessors and much of human society revolves around computers and cell phones connected by the Internet, it seems prosaic to emphasize the centrality of information, computation, and communication. In Wiener's time, however, the first digital computers had only just come into existence, and the Internet was not even a twinkle in the technologist's eye.

Wiener's powerful conception of not just engineered complex systems but all complex systems as revolving around cycles of signals and computation led to tremendous contributions to the development of complex human-made systems. The methods he and others developed for the control of missiles, for example, were later put to work in building the Saturn V moon rocket, one of the crowning engineering achievements of the 20th century. In particular, Wiener's applications of cybernetic concepts to the brain and to computerized perception are the direct precursors of today's neural-network-based deep-learning circuits, and of artificial intelligence itself. But current developments in these fields have diverged from his vision, and their future development may well affect the human uses both of human beings and of machines.

What Wiener Got Wrong

It is exactly in the extension of the cybernetic idea to human beings that Wiener's conceptions missed their target. Setting aside his ruminations on language, law, and human society for the moment, look at a humbler but potentially useful innovation that he thought was imminent in 1950. Wiener notes that prosthetic limbs would be much more effective if their wearers could communicate directly with their prosthetics by their own neural signals, receiving information about pressure and position from the limb and directing its subsequent motion. This turned out to be a much harder problem than Wiener envisaged: Seventy years down the road, prosthetic limbs that incorporate neural feedback are still in the very early stages. Wiener's concept was an excellent one—it's just that the problem of interfacing neural signals with mechanical-electrical devices is hard.

More significantly, Wiener (along with pretty much everyone else in 1950) greatly underappreciated the potential of digital computation. As noted, Wiener's mathematical contributions were to the analysis of signals and noise and his analytic methods apply to continuously varying, or analog, signals. Although he participated in the wartime development of digital computation, he never foresaw the exponential explosion of computing power brought on by the introduction and progressive miniaturization of semiconductor circuits. This is hardly Wiener's fault: The transistor hadn't been invented yet, and the vacuum-tube technology of the digital computers he was familiar with was clunky, unreliable, and unscalable to ever larger devices. In an appendix to the 1948 edition of *Cybernetics,* he anticipates chess-playing computers and predicts that they'll be able to look two or three moves ahead. He might have been surprised to learn that within half a century a computer would beat the human world champion at chess.

Technological Overestimation and the Existential Risks of the Singularity

When Wiener wrote his books, a significant example of technological overestimation was about to occur. The 1950s saw the first efforts at developing artificial intelligence, by researchers such as Herbert Simon, John McCarthy, and Marvin Minsky, who began to program computers to perform simple tasks and to construct rudimentary robots. The success of these initial efforts inspired Simon to declare that "machines will be capable, within twenty years, of doing any work a man can do." Such predictions turned out to be spectacularly wrong. As they became more powerful, computers got better and better at playing chess because they could systematically generate and evaluate a vast selection of possible future moves. But the majority of predictions of AI, e.g., robotic maids, turned out to be illusory. When Deep Blue beat Garry Kasparov at chess in 1997, the most powerful room-cleaning robot was a Roomba, which moved around vacuuming at random and squeaked when it got caught under the couch.

Technological prediction is particularly chancy, given that technologies progress by a series of refinements, halted by obstacles and overcome by innovation. Many obstacles and some innovations can be anticipated, but more cannot. In my own work with experimentalists on building quantum computers, I typically find that some of the technological steps I expect to be easy turn out to be impossible, whereas some of the tasks I imagine to be impossible turn out to be easy. You don't know until you try.

In the 1950s, partly inspired by conversations with Wiener, John von Neumann introduced the notion of the "technological singularity." Technologies tend to improve exponentially, doubling in power or sensitivity over some interval of time. (For example, since 1950, computer technologies have been doubling in power roughly every two years, an observation enshrined as Moore's Law.) Von Neumann extrapolated from the observed exponential rate of technological improvement to predict that "technological progress will become incomprehensively rapid and complicated," outstripping human capabilities in the not too distant future. Indeed, if one extrapolates the growth of raw computing power—expressed in terms of bits and bit flips—into the future at its current rate, computers should match human brains sometime in the next two to four decades (depending on how one estimates the information-processing power of human brains).

The failure of the initial overly optimistic predictions of AI dampened talk about the technological singularity for a few decades, but since the 2005 publication of Ray Kurzweil's *The Singularity is Near,* the idea of technological advance leading to superintelligence is back in force. Some believers, Kurzweil included, regard this singularity as an opportunity: Humans can merge their brains with the superintelligence and thereby live forever. Others, such as Stephen Hawking and Elon Musk, worried that this superintelligence would prove to be malign and regarded it as the greatest existing threat to human civilization. Still others, including some of the contributors to the present volume, think such talk is overblown.

Wiener's life work and his failure to predict its consequences are intimately bound up in the idea of an impending technological singularity. His work on neuroscience and his initial support of McCulloch and Pitts adumbrated the startlingly effective deep-learning methods of the present day. Over the past decade, and particularly in the last five years, such deep-learning techniques have finally exhibited what Wiener liked to call *Gestalt*—for example, the ability to recognize that a circle is a circle even if when slanted sideways it looks like an ellipse. His work on control, combined with his work on neuromuscular feedback, was significant for the development of robotics and is the inspiration for neural-based human/machine interfaces. His lapses in technological prediction, however, suggest that we should take the notion of a technological singularity with a grain of salt. The general difficulties of technological prediction and the problems specific to the development of a superintelligence should warn us against overestimating both the power and the efficacy of information processing.

The Arguments for Singularity Skepticism

No exponential increase lasts forever. An atomic explosion grows exponentially, but only until it runs out of fuel. Similarly, the exponential advances in Moore's Law are starting to run into limits imposed by basic physics. The clock speed of computers maxed out at a few gigahertz a decade and a half ago, simply because the chips were starting to melt. The miniaturization of transistors is already running into quantum-mechanical problems due to tunneling and leakage currents. Eventually, the various exponential improvements in memory and processing driven by Moore's Law will grind to a halt. A few more decades, however, will probably be time enough for the raw information-processing power of computers to match that of brains—at least by the crude measures of number of bits and number of bit-flips per second.

Human brains are intricately constructed, the process of millions of years of natural selection. In Wiener's time, our understanding of the architecture of the brain was rudimentary and simplistic. Since then, increasingly sensitive instrumentation and imaging techniques have shown our brains to be far more varied in structure and complex in function than Wiener could have imagined. I recently asked Tomaso Poggio, one of the pioneers of modern neuroscience, whether he was worried that computers, with their rapidly increasing processing power, would soon emulate the functioning of the human brain. "Not a chance," he replied.

The recent advances in deep learning and neuromorphic computation are very good at reproducing a particular aspect of human intelligence focused on the operation of the brain's cortex, where patterns are processed and recognized. These advances have enabled a computer to beat the world champion not just of chess but of Go, an impressive feat, but they're far short of enabling a computerized robot to tidy a room. (In fact, robots with anything approaching human capability in a broad range of flexible movements are still far away—search "robots falling down." Robots are good at making precision welds on assembly lines, but they still can't tie their own shoes.)

Raw information-processing power does not mean sophisticated information-processing power. While computer power has advanced exponentially, the programs by which computers operate have often failed to advance at all. One of the primary responses of software companies to increased processing power is to add "useful" features which often make the software harder to use. Microsoft Word reached its apex in 1995 and has been slowly sinking under the weight of added features ever since. Once Moore's Law starts slowing down, software developers will be confronted with hard choices between efficiency, speed, and functionality.

A major fear of the singulariteers is that as computers become more involved in designing their own software they'll rapidly bootstrap themselves into achieving superhuman computational ability. But the evidence of machine learning points in the opposite direction. As machines become more powerful and capable of learning, they learn more and more as human beings do—from multiple examples, often under the supervision of human and machine teachers. Education is as hard and slow for computers as it is for teenagers. Consequently, systems based on deep learning are becoming more rather than less human. The skills they bring to learning are not "better than" but "complementary to" human learning: Computer learning systems can identify patterns that humans cannot—and vice versa. The world's best chess players are neither computers nor humans but humans working together with computers. Cyberspace is indeed inhabited by harmful programs, but these primarily take the form of malware—viruses notable for their malign mindlessness, not for their superintelligence.

Whither Wiener

Wiener noted that exponential technological progress is a relatively modern phenomenon and not all of it is good. He regarded atomic weapons and the development of missiles with nuclear warheads as a recipe for the suicide of the human species. He compared the headlong exploitation of the planet's resources with the Mad Tea Party of *Alice in Wonderland:* Having laid waste to one local environment, we make progress simply by moving on to lay waste to the next. Wiener's optimism about the development of computers and neuro-mechanical systems was tempered by his pessimism about their exploitation by authoritarian governments, such as the Soviet Union, and the tendency for democracies, such as the United States, to become more authoritarian themselves in confronting the threat of authoritarianism.

What would Wiener think of the current human use of human beings? He would be amazed by the power of computers and the Internet. He would be happy that the early neural nets in which he played a role have spawned powerful deep-learning systems that exhibit the perceptual ability he demanded of them—although he might not be impressed that one of the most prominent examples of such computerized *Gestalt* is the ability to recognize photos of kittens on the World Wide Web. Rather than regarding machine intelligence as a threat, I suspect he would regard it as a phenomenon in its own right, different from and co-evolving with our own human intelligence.

Unsurprised by global warming—the Mad Tea Party of our era—Wiener would applaud the exponential improvement in alternative-energy technologies and would apply his cybernetic expertise to developing the intricate set of feedback loops needed to incorporate such technologies into the coming smart electrical grid. Nonetheless, recognizing that the solution to the problem of climate change is at least as much political as it is technological, he would undoubtedly be pessimistic about our chances of solving this civilization-threatening problem in time. Wiener hated hucksters—political hucksters most of all—but he acknowledged that hucksters would always be with us.

It's easy to forget just how scary Wiener's world was. The United States and the Soviet Union were in a full-out arms race, building hydrogen bombs mounted on nuclear warheads carried by intercontinental ballistic missiles guided by navigation systems to which Wiener himself—to his dismay—had contributed. I was four years old when Wiener died. In 1964, my nursery school class was practicing duck-and-cover under our desks to prepare for a nuclear attack. Given the human use of human beings in his own day, if he could see our current state, Wiener's first response would be to be relieved that we are still alive.

In the 1980s, **Judea Pearl** *introduced a new approach to artificial intelligence called Bayesian networks. This probability-based model of machine reasoning enabled machines to function—in a complex and uncertain world—as "evidence engines," continuously revising their beliefs in light of new evidence.*

Within a few years, Judea's Bayesian networks had completely overshadowed the previous rule-based approaches to artificial intelligence. The advent of deep learning—in which computers, in effect, teach themselves to be smarter by observing tons of data, has given him pause, because this method lacks transparency.

While recognizing the impressive achievements in deep learning by colleagues such as Michael Jordan and Geoffrey Hinton, he feels uncomfortable with this kind of opacity. He set out to understand the theoretical limitations of deep-learning systems and points out that basic barriers exist that will prevent them from achieving a human kind of intelligence, no matter what we do. Leveraging the computational benefits of Bayesian networks, Judea realized that the combination of simple graphical models and data could also be used to represent and infer cause-effect relationships. The significance of this discovery far transcends its roots in artificial intelligence. His latest book explains causal thinking to the general public; you might say it is a primer on how to think even though human.

Judea's principled, mathematical approach to causality is a profound contribution to the realm of ideas. It has already benefited virtually every field of inquiry, especially the data-intensive health and social sciences.

THE LIMITATIONS OF OPAQUE LEARNING MACHINES
Judea Pearl

***Judea Pearl** is a professor of computer science and director of the Cognitive Systems Laboratory at UCLA. His most recent book, co-authored with Dana Mackenzie, is* The Book of Why: The New Science of Cause and Effect.

As a former physicist, I was extremely interested in cybernetics. Though it did not utilize the full power of Turing Machines, it was highly transparent, perhaps because it was founded on classical control theory and information theory. We are losing this transparency now, with the deep-learning style of machine learning. It is fundamentally a curve-fitting exercise that adjusts weights in intermediate layers of a long input-output chain.

I find many users who say that it "works well and we don't know why." Once you unleash it on large data, deep learning has its own dynamics, it does its own repair and its own optimization, and it gives you the right results most of the time. But when it doesn't, you don't have a clue about what went wrong and what should be fixed. In particular, you do not know if the fault is in the program, in the method, or because things have changed in the environment. We should be aiming at a different kind of transparency.

Some argue that transparency is not really needed. We don't understand the neural architecture of the human brain, yet it runs well, so we forgive our meager understanding and use human helpers to great advantage. In the same way, they argue, why not unleash deep-learning systems and create intelligence without understanding how they work? I buy this argument to some extent. I personally don't like opacity, so I won't spend my time on deep learning, but I know that it has a place in the makeup of intelligence. I know that non-transparent systems can do marvelous jobs, and our brain is proof of that marvel.

But this argument has its limitation. The reason we can forgive our meager understanding of how human brains work is because our brains work the same way, and that enables us to communicate with other humans, learn from them, instruct them, and motivate them in our own native language. If our robots will all be as opaque as AlphaGo, we won't be able to hold a meaningful conversation with them, and that would be unfortunate. We will need to retrain them whenever we make a slight change in the task or in the operating environment.

So, rather than experimenting with opaque learning machines, I am trying to understand their theoretical limitations and examine how these limitations can be overcome. I do it in the context of causal-reasoning tasks, which govern much of how scientists think about the world and, at the same time, are rich in intuition and toy examples, so we can monitor the progress in our analysis. In this context, we've discovered that some basic barriers exist, and that unless they are breached we won't get a real human kind of intelligence no matter what we do. I believe that charting these barriers may be no less important than banging our heads against them.

Current machine-learning systems operate almost exclusively in a statistical, or model-blind, mode, which is analogous in many ways to fitting a function to a cloud of data points. Such systems cannot reason about "what if ?" questions and, therefore, cannot serve as the basis for Strong AI—that is, artificial intelligence that emulates human-level reasoning and competence. To achieve human-level intelligence, learning machines need the guidance of a blueprint of reality, a model—similar to a road map that guides us in driving through an unfamiliar city.

To be more specific, current learning machines improve their performance by optimizing parameters for a stream of sensory inputs received from the environment. It is a slow process, analogous to the natural-selection process that drives Darwinian evolution. It explains how species like eagles and snakes have developed superb vision systems over millions of years. It cannot explain, however, the super-evolutionary process that enabled humans to build eyeglasses and telescopes over barely a thousand years. What humans had that other species lacked was a mental representation of their environment—representations that they could manipulate at will to imagine alternative hypothetical environments for planning and learning.

Historians of *Homo sapiens* such as Yuval Noah Harari and Steven Mithen are in general agreement that the decisive ingredient that gave our ancestors the ability to achieve global dominion about forty thousand years ago was their ability to create and store a mental representation of their environment, interrogate that representation, distort it by mental acts of imagination, and finally answer the "What if?" kind of questions. Examples are interventional questions ("What if I do such-and-such?") and retrospective or counterfactual questions ("What if I had acted differently?"). No learning machine in operation today can answer such questions. Moreover, most learning machines do not possess a representation from which the answers to such questions can be derived.

With regard to causal reasoning, we find that you can do very little with any form of model-blind curve fitting, or any statistical inference, no matter how sophisticated the fitting process is. We have also found a theoretical framework for organizing such limitations, which forms a hierarchy.

On the first level, you have statistical reasoning, which can tell you only how seeing one event would change your belief about another. For example, what can a symptom tell you about a disease?

Then you have a second level, which entails the first but not vice versa. It deals with actions. "What will happen if we raise prices?" "What if you make me laugh?" That second level of the hierarchy requires information about interventions which is not available in the first. This information can be encoded in a graphical model, which merely tells us which variable responds to another.

The third level of the hierarchy is the counterfactual. This is the language used by scientists. "What if the object were twice as heavy?" "What if I were to do things differently?" "Was it the aspirin that cured my headache, or the nap I took?" Counterfactuals are at the top level in the sense that they cannot be derived even if we could predict the effects of all actions. They need an extra ingredient, in the form of equations, to tell us how variables respond to changes in other variables.

One of the crowning achievements of causal-inference research has been the algorithmization of both interventions and counterfactuals, the top two layers of the hierarchy. In other words, once we encode our scientific knowledge in a model (which may be qualitative), algorithms exist that examine the model and determine if a given query, be it about an intervention or about a counterfactual, can be estimated from the available data—and, if so, how. This capability has transformed dramatically the way scientists are doing science, especially in such data-intensive sciences as sociology and epidemiology, for which causal models have become a second language. These disciplines view their linguistic transformation as the Causal Revolution. As Harvard social scientist Gary King puts it, "More has been learned about causal inference in the last few decades than the sum total of everything that had been learned about it in all prior recorded history."

As I contemplate the success of machine learning and try to extrapolate it to the future of AI, I ask myself, "Are we aware of the basic limitations that were discovered in the causal-inference arena? Are we prepared to circumvent the theoretical impediments that prevent us from going from one level of the hierarchy to another level?"

I view machine learning as a tool to get us from data to probabilities. But then we still have to make two extra steps to go from probabilities into real understandingnce—two big steps. One is to predict the effect of actions, and the second is counterfactual imagination. We cannot claim to understand reality unless we make the last two steps.

In his insightful book *Foresight and Understanding* (1961), the philosopher Stephen Toulmin identified the transparency-versus-opacity contrast as the key to understanding the ancient rivalry between Greek and Babylonian sciences. According to Toulmin, the Babylonian astronomers were masters of black-box predictions, far surpassing their Greek rivals in accuracy and consistency of celestial observations. Yet Science favored the creative-speculative strategy of the Greek astronomers, which was wild with metaphorical imagery: circular tubes full of fire, small holes through which celestial fire was visible as stars, and hemispherical Earth riding on turtleback. It was this wild modeling strategy, not Babylonian extrapolation, that jolted Eratosthenes (276-194 BC) to perform one of the most creative experiments in the ancient world and calculate the circumference of the Earth. Such an experiment would never have occurred to a Babylonian data-fitter.

Model-blind approaches impose intrinsic limitations on the cognitive tasks that Strong AI can perform. My general conclusion is that human-level AI cannot emerge solely from model-blind learning machines; it requires the symbiotic collaboration of data and models.

Data science is a science only to the extent that it facilitates the interpretation of data—a two-body problem, connecting data to reality. Data alone are hardly a science, no matter how "big" they get and how skillfully they are manipulated. Opaque learning systems may get us to Babylon, but not to Athens.

Computer scientist **Stuart Russell**, *along with Elon Musk, Stephen Hawking, Max Tegmark, and numerous others, has insisted that attention be paid to the potential dangers in creating an intelligence on the superhuman (or even the human) level—an AGI, or artificial general intelligence, whose programmed purposes may not necessarily align with our own.*

His early work was on understanding the notion of "bounded optimality" as a formal definition of intelligence that you can work on. He developed the technique of rational meta-reasoning, "which is, roughly speaking, that you do the computations that you expect to improve the quality of your ultimate decision as quickly as possible." He has also worked on the unification of probability theory and first-order logic—resulting in a new and far more effective monitoring system for the Comprehensive Nuclear Test Ban Treaty—and on the problem of decision making over long timescales (his presentations on the latter topic are usually titled, "Life: Play and Win in 20 trillion moves").

He is very concerned with the continuing development of autonomous weapons, such as lethal micro-drones, which are potentially scalable into weapons of mass destruction. He drafted the letter from forty of the world's leading AI researchers to President Obama which resulted in high-level national-security meetings.

His current work centers on the creation of what he calls "provably beneficial" AI. He wants to ensure AI safety by "imbuing systems with explicit uncertainty" about the objectives of their human programmers, an approach that would amount to a fairly radical reordering of current AI research.

Stuart is also on the radar of anyone who has taken a course in computer science in the last twenty-odd years. He is co-author of "the" definitive AI textbook, with an estimated 5-million-plus English-language readers.

THE PURPOSE PUT INTO THE MACHINE
Stuart Russell

***Stuart Russell** is a professor of computer science and Smith-Zadeh Professor in Engineering at UC Berkeley. He is the coauthor (with Peter Norvig) of* Artificial Intelligence: A Modern Approach.

Among the many issues raised in Norbert Wiener's *The Human Use of Human Beings* (1950) that are currently relevant, the most significant to the AI researcher is the possibility that humanity may cede control over its destiny to machines.

Wiener considered the machines of the near future as far too limited to exert global control, imagining instead that machines and machine-like control systems would be wielded by human elites to reduce the great mass of humanity to the status of "cogs and levers and rods." Looking further ahead, he pointed to the difficulty of correctly specifying objectives for highly capable machines, noting

> a few of the simpler and more obvious truths of life, such as that when a djinnee is found in a bottle, it had better be left there; that the fisherman who craves a boon from heaven too many times on behalf of his wife will end up exactly where he started; that if you are given three wishes, you must be very careful what you wish for.

The dangers are clear enough:

> Woe to us if we let [the machine] decide our conduct, unless we have previously examined the laws of its action, and know fully that its conduct will be carried out on principles acceptable to us! On the other hand, the machine like the djinnee, which can learn and can make decisions on the basis of its learning, will in no way be obliged to make such decisions as we should have made, or will be acceptable to us.

Ten years later, after seeing Arthur Samuel's checker-playing program learn to play checkers far better than its creator, Wiener published "Some Moral and Technical Consequences of Automation" in *Science*. In this paper, the message is even clearer:

> If we use, to achieve our purposes, a mechanical agency with whose operation we cannot efficiently interfere . . . we had better be quite sure that the purpose put into the machine is the purpose which we really desire. . . .

In my view, this is the source of the existential risk from superintelligent AI cited in recent years by such observers as Elon Musk, Bill Gates, Stephen Hawking, and Nick Bostrom.

Putting Purposes Into Machines

The goal of AI research has been to understand the principles underlying intelligent behavior and to build those principles into machines that can then exhibit such behavior. In the 1960s and 1970s, the prevailing theoretical notion of intelligence was the capacity for logical reasoning, including the ability to derive plans of action guaranteed to achieve a specified goal. More recently, a consensus has emerged around the idea of a rational agent that perceives, and acts in order to maximize, its expected utility. Subfields such as logical planning, robotics, and natural-language understanding are special cases of the general paradigm. AI has incorporated probability theory to handle uncertainty, utility theory to define objectives, and statistical learning to allow machines to adapt to new circumstances. These developments have created strong connections to other disciplines that build on similar concepts, including control theory, economics, operations research, and statistics.

In both the logical-planning and rational-agent views of AI, the machine's objective—whether in the form of a goal, a utility function, or a reward function (as in reinforcement learning)—is specified exogenously. In Wiener's words, this is "the purpose put into the machine." Indeed, it has been one of the tenets of the field that AI systems should be general-purpose—i.e., capable of accepting a purpose as input and then achieving it—rather than special-purpose, with their goal implicit in their design. For example, a self-driving car should accept a destination as input instead of having one fixed destination. However, some aspects of the car's "driving purpose" are fixed, such as that it shouldn't hit pedestrians. This is built directly into the car's steering algorithms rather than being explicit: No self-driving car in existence today "knows" that pedestrians prefer not to be run over.

Putting a purpose into a machine which optimizes its behavior according to clearly defined algorithms seems an admirable approach to ensuring that the machine's "conduct will be carried out on principles acceptable to us!" But, as Wiener warns, we need to put in the right purpose. We might call this the King Midas problem: Midas got exactly what he asked for—namely, that everything he touched would turn to gold—but too late he discovered the drawbacks of drinking liquid gold and eating solid gold. The technical term for putting in the right purpose is *value alignment*. When it fails, we may inadvertently imbue machines with objectives counter to our own. Tasked with finding a cure for cancer as fast as possible, an AI system might elect to use the entire human population as guinea pigs for its experiments. Asked to de-acidify the oceans, it might use up all the oxygen in the atmosphere as a side effect. This is a common characteristic of systems that optimize: Variables not included in the objective may be set to extreme values to help optimize that objective.

Unfortunately, neither AI nor other disciplines (economics, statistics, control theory, operations research) built around the optimization of objectives have much to say about how to identify the purposes "we really desire." Instead, they assume that objectives are simply implanted into the machine. AI research, in its present form, studies the ability to achieve objectives, not the design of those objectives.

Steve Omohundro has pointed to a further difficulty, observing that intelligent entities must act to preserve their own existence. This tendency has nothing to do with a self-preservation instinct or any other biological notion; it's just that an entity cannot achieve its objectives if it's dead. According to Omohundro's argument, a superintelligent machine that has an off-switch—which some, including Alan Turing himself, in a 1951 talk on BBC Radio 3, have seen as our potential salvation—will take steps to disable the switch in some way.[1] Thus we may face the prospect of superintelligent machines—their actions by definition unpredictable by us and their imperfectly specified objectives conflicting with our own—whose motivation to preserve their existence in order to achieve those objectives may be insuperable.

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[1] Omohundro, "The Basic AI Drives," in *Proc. First AGI Conf.,* 171: "Artificial General Intelligence," eds. P. Wang, B. Goertzel, & S. Franklin (IOS press, 2008).

1001 Reasons to Pay No Attention

Objections have been raised to these arguments, primarily by researchers within the AI community. The objections reflect a natural defensive reaction, coupled perhaps with a lack of imagination about what a superintelligent machine could do. None hold water on closer examination. Here are some of the more common ones:

- *Don't worry, we can just switch it off.*[2] This is often the first thing that pops into a layperson's head when considering risks from superintelligent AI—as if a superintelligent entity would never think of that. This is rather like saying that the risk of losing to DeepBlue or AlphaGo is negligible—all one has to do is make the right moves.
- *Human-level or superhuman AI is impossible*.[3] This is an unusual claim for AI researchers to make, given that, from Turing onward, they have been fending off such claims from philosophers and mathematicians. The claim, which is backed by no evidence, appears to concede that if superintelligent AI *were* possible, it *would* be a significant risk. It's as if a bus driver, with all of humanity as passengers, said, "Yes, I am driving toward a cliff—in fact, I'm pressing the pedal to the metal! But trust me, we'll run out of gas before we get there!" The claim represents a foolhardy bet against human ingenuity. We have made such bets before and lost. On September 11, 1933, renowned physicist Ernest Rutherford stated, with utter confidence, "Anyone who expects a source of power from the transformation of these atoms is talking moonshine." On September 12, 1933, Leo Szilard invented the neutron-induced nuclear chain reaction. A few years later he demonstrated such a reaction in his laboratory at Columbia University. As he recalled in a memoir: "We switched everything off and went home. That night, there was very little doubt in my mind that the world was headed for grief."
- *It's too soon to worry about it.* The right time to worry about a potentially serious problem for humanity depends not just on when the problem will occur but also on how much time is needed to devise and implement a solution that avoids the risk. For example, if we were to detect a large asteroid predicted to collide with the Earth in 2067, would we say, "It's too soon to worry"? And if we consider the global catastrophic risks from climate change predicted to occur later in this century, is it too soon to take action to prevent them? On the contrary, it may be too late. The relevant timescale for human-level AI is less predictable, but, like nuclear fission, it might arrive considerably sooner than expected. One variation on this argument is Andrew Ng's statement that it's "like worrying about overpopulation on Mars." This appeals to a convenient analogy: Not only is the

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[2] AI researcher Jeff Hawkins, for example, writes, "Some intelligent machines will be virtual, meaning they will exist and act solely within computer networks. . . . It is always possible to turn off a computer network, even if painful." https://www.recode.net/2015/3/2/11559576/.

[3] The AI100 report (Peter Stone *et al.*), sponsored by Stanford University, includes the following: "Unlike in the movies, there is no race of superhuman robots on the horizon or probably even possible." https://ai100.stanford.edu/2016-report.

risk easily managed and far in the future, but also it's extremely unlikely that we'd even try to move billions of humans to Mars in the first place. The analogy is a false one, however. We are already devoting huge scientific and technical resources to creating ever-more-capable AI systems. A more apt analogy would be a plan to move the human race to Mars with no consideration for what we might breathe, drink, or eat once we'd arrived.

- *Human-level AI isn't really imminent, in any case.* The AI100 report, for example, assures us, "Contrary to the more fantastic predictions for AI in the popular press, the Study Panel found no cause for concern that AI is an imminent threat to humankind." This argument simply misstates the reasons for concern, which are not predicated on imminence. In his 2014 book, *Superintelligence: Paths, Dangers, Strategies,* Nick Bostrom, for one, writes, "It is no part of the argument in this book that we are on the threshold of a big breakthrough in artificial intelligence, or that we can predict with any precision when such a development might occur."
- *You're just a Luddite*. It's an odd definition of Luddite that includes Turing, Wiener, Minsky, Musk, and Gates, who rank among the most prominent contributors to technological progress in the 20th and 21st centuries.[4] Furthermore, the epithet represents a complete misunderstanding of the nature of the concerns raised and the purpose for raising them. It is as if one were to accuse nuclear engineers of Luddism if they pointed out the need for control of the fission reaction. Some objectors also use the term "anti-AI," which is rather like calling nuclear engineers "anti-physics." The purpose of understanding and preventing the risks of AI is to ensure that we can realize the benefits. Bostrom, for example, writes that success in controlling AI will result in "a civilizational trajectory that leads to a compassionate and jubilant use of humanity's cosmic endowment"—hardly a pessimistic prediction.
- *Any machine intelligent enough to cause trouble will be intelligent enough to have appropriate and altruistic objectives.*[5] (Often, the argument adds the premise that people of greater intelligence tend to have more altruistic objectives, a view that may be related to the self-conception of those making the argument.) This argument is related to Hume's *is-ought* problem and G. E. Moore's naturalistic fallacy, suggesting that somehow the machine, as a result of its intelligence, will simply *perceive* what is right, given its experience of the world. This is implausible; for example, one cannot perceive, in the design of a chessboard and chess pieces, the goal of checkmate; the same chessboard and pieces can be used for suicide chess, or indeed many other games still to be invented. Put another way: Where Bostrom imagines humans driven extinct by a putative robot that turns the planet into a sea of paper clips, we humans see this outcome as tragic,

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[4] Elon Musk, Stephen Hawking, and others (including, apparently, the author) received the 2015 Luddite of the Year Award from the Information Technology Innovation Foundation: https://itif.org/publications/2016/01/19/artificial-intelligence-alarmists-win-itif%E2%80%99s-annual-luddite-award.

[5] Rodney Brooks, for example, asserts that it's impossible for a program to be "smart enough that it would be able to invent ways to subvert human society to achieve goals set for it by humans, without understanding the ways in which it was causing problems for those same humans." http://rodneybrooks.com/the-seven-deadly-sins-of-predicting-the-future-of-ai/.

whereas the iron-eating bacterium *Thiobacillus ferrooxidans* is thrilled. Who's to say the bacterium is wrong? The fact that a machine has been given a fixed objective by humans doesn't mean that it will automatically recognize the importance to humans of things that aren't part of the objective. Maximizing the objective may well cause problems for humans, but, by definition, the machine will not recognize those problems as problematic.

- *Intelligence is multidimensional, "so 'smarter than humans' is a meaningless concept."*[6] It is a staple of modern psychology that IQ doesn't do justice to the full range of cognitive skills that humans possess to varying degrees. IQ is indeed a crude measure of human intelligence, but it is utterly meaningless for current AI systems, because their capabilities across different areas are uncorrelated. How do we compare the IQ of Google's search engine, which cannot play chess, with that of DeepBlue, which cannot answer search queries?

  None of this supports the argument that because intelligence is multifaceted, we can ignore the risk from superintelligent machines. If "smarter than humans" is a meaningless concept, then "smarter than gorillas" is also meaningless, and gorillas therefore have nothing to fear from humans; clearly, that argument doesn't hold water. Not only is it logically possible for one entity to be more capable than another across all the relevant dimensions of intelligence, it is also possible for one species to represent an existential threat to another even if the former lacks an appreciation for music and literature.

Solutions

Can we tackle Wiener's warning head-on? Can we design AI systems whose purposes don't conflict with ours, so that we're sure to be happy with how they behave? On the face of it, this seems hopeless, because it will doubtless prove infeasible to write down our purposes correctly or imagine all the counterintuitive ways a superintelligent entity might fulfill them.

If we treat superintelligent AI systems as if they were black boxes from outer space, then indeed we have no hope. Instead, the approach we seem obliged to take, if we are to have any confidence in the outcome, is to define some formal problem F, and design AI systems to be F-solvers, such that no matter how perfectly a system solves F, we're guaranteed to be happy with the solution. If we can work out an appropriate F that has this property, we'll be able to create *provably beneficial* AI.

Here's an example of how *not* to do it: Let a reward be a scalar value provided periodically by a human to the machine, corresponding to how well the machine has behaved during each period, and let F be the problem of maximizing the expected sum of rewards obtained by the machine. The optimal solution to this problem is not, as one might hope, to behave well, but instead to take control of the human and force him or her to provide a stream of maximal rewards. This is known as the wireheading problem, based on observations that humans themselves are susceptible to the same problem if given a means to electronically stimulate their own pleasure centers.

There is, I believe, an approach that may work. Humans can reasonably be described as having (mostly implicit) preferences over their future lives—that is, given enough time and unlimited visual aids, a human could express a preference (or indifference) when offered a choice between two future lives laid out before him or her in all their aspects. (This idealization ignores the possibility that our minds are composed of subsystems with incompatible preferences; if true, that would limit a machine's ability to optimally satisfy our preferences, but it doesn't seem to prevent us from designing machines that avoid catastrophic outcomes.) The formal problem F to be solved by the machine in this case is to maximize human future-life preferences subject to its initial uncertainty as to what they are. Furthermore, although the future-life preferences are hidden variables, they're grounded in a voluminous source of evidence—namely, all of the human choices ever made. This formulation sidesteps Wiener's problem: The machine may learn more about human preferences as it goes along, of course, but it will never achieve complete certainty.

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[6] Kevin Kelly, "The Myth of a Superhuman AI," *Wired*, Apr. 25, 2017.

A more precise definition is given by the framework of cooperative inverse-reinforcement learning, or CIRL. A CIRL problem involves two agents, one human and the other a robot. Because there are two agents, the problem is what economists call a game. It is a game of partial information, because while the human knows the reward function, the robot doesn't—even though the robot's job is to maximize it.

A simple example: Suppose that Harriet, the human, likes to collect paper clips and staples and her reward function depends on how many of each she has. More precisely, if she has p paper clips and s staples, her degree of happiness is $\theta p + (1\text{-}\theta)s$, where θ *is* essentially an exchange rate between paper clips and staples. If θ is 1, she likes only paper clips; if θ is 0, she likes only staples; if θ is 0.5, she is indifferent between them; and so on. It's the job of Robby, the robot, to produce the paper clips and staples. The point of the game is that Robby wants to make Harriet happy, but he doesn't know the value of θ, so he isn't sure how many of each to produce.

Here's how the game works. Let the true value of θ be 0.49—that is, Harriet has a slight preference for staples over paper clips. And let's assume that Robby has a uniform prior belief about θ—that is, he believes θ is equally likely to be any value between 0 and 1. Harriet now gets to do a small demonstration, producing either two paper clips or two staples or one of each. After that, the robot can produce either ninety paper clips, or ninety staples, or fifty of each. You might think that Harriet, who prefers staples to paper clips, should produce two staples. But in that case, Robby's rational response would be to produce ninety staples (with a total value to Harriet of 45.9), which is a less desirable outcome for Harriet than fifty of each (total value 50.0). The optimal solution of this particular game is that Harriet produces one of each, so then Robby makes fifty of each. Thus, the way the game is defined encourages Harriet to "teach" Robby—as long as she knows that Robby is watching carefully.

Within the CIRL framework, one can formulate and solve the off-switch problem—that is, the problem of how to prevent a robot from disabling its off-switch. (Turing may rest easier.) A robot that's uncertain about human preferences actually benefits from being switched off, because it understands that the human will press the off-switch to prevent the robot from doing something counter to those preferences. Thus the robot is incentivized to preserve the off-switch, and this incentive derives directly from its uncertainty about human preferences.[7]

The off-switch example suggests some templates for controllable-agent designs and provides at least one case of a provably beneficial system in the sense introduced above. The overall approach resembles mechanism-design problems in economics, wherein one incentivizes other agents to behave in ways beneficial to the designer. The key difference here is that we are building one of the agents in order to benefit the other.

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[7] See Hadfield-Menell et al., "The Off-Switch Game," https://arxiv.org/pdf/1611.08219.pdf.

There are reasons to think this approach may work in practice. First, there is abundant written and filmed information about humans doing things (and other humans reacting). Technology to build models of human preferences from this storehouse will presumably be available long before superintelligent AI systems are created. Second, there are strong, near-term economic incentives for robots to understand human preferences: If one poorly designed domestic robot cooks the cat for dinner, not realizing that its sentimental value outweighs its nutritional value, the domestic-robot industry will be out of business.

There are obvious difficulties, however, with an approach that expects a robot to learn underlying preferences from human behavior. Humans are irrational, inconsistent, weak-willed, and computationally limited, so their actions don't always reflect their true preferences. (Consider, for example, two humans playing chess. Usually, one of them loses, but not on purpose!) So robots can learn from nonrational human behavior only with the aid of much better cognitive models of humans. Furthermore, practical and social constraints will prevent all preferences from being maximally satisfied simultaneously, which means that robots must mediate among conflicting preferences—something that philosophers and social scientists have struggled with for millennia. And what should robots learn from humans who enjoy the suffering of others? It may be best to zero out such preferences in the robots' calculations.

Finding a solution to the AI control problem is an important task; it may be, in Bostrom's words, "the essential task of our age." Up to now, AI research has focused on systems that are better at making decisions, but this is not the same as making better decisions. No matter how excellently an algorithm maximizes, and no matter how accurate its model of the world, a machine's decisions may be ineffably stupid in the eyes of an ordinary human if its utility function is not well aligned with human values.

This problem requires a change in the definition of AI itself—from a field concerned with pure intelligence, independent of the objective, to a field concerned with systems that are provably beneficial for humans. Taking the problem seriously seems likely to yield new ways of thinking about AI, its purpose, and our relationship to it.

In 2005, **George Dyson***, a historian of science and technology, visited Google at the invitation of some Google engineers. The occasion was the sixtieth anniversary of John von Neumann's proposal for a digital computer. After the visit, George wrote an essay, "Turing's Cathedral," which, for the first time, alerted the public about what Google's founders had in store for the world. "We are not scanning all those books to be read by people," explained one of his hosts after his talk. "We are scanning them to be read by an AI."*

George offers a counternarrative to the digital age. His interests have included the development of the Aleut kayak, the evolution of digital computing and telecommunications, the origins of the digital universe, and a path not taken into space. His career (he never finished high school, yet has been awarded an honorary doctorate from the University of Victoria) has proved as impossible to classify as his books.

He likes to point out that analog computing, once believed to be as extinct as the differential analyzer, has returned. He argues that while we may use digital components, at a certain point the analog computing being performed by the system far exceeds the complexity of the digital code with which it is built. He believes that true artificial intelligence—with analog control systems emerging from a digital substrate the way digital computers emerged out of analog components in the aftermath of World War II—may not be as far off as we think.

In this essay, George contemplates the distinction between analog and digital computation and finds analog to be alive and well. Nature's response to an attempt to program machines to control everything may be machines without programming over which no one has control.

THE THIRD LAW

George Dyson

***George Dyson** is a historian of science and technology and the author of* Baidarka: the Kayak, Darwin Among the Machines, Project Orion, *and* Turing's Cathedral.

The history of computing can be divided into an Old Testament and a New Testament: before and after electronic digital computers and the codes they spawned proliferated across the Earth. The Old Testament prophets, who delivered the underlying logic, included Thomas Hobbes and Gottfried Wilhelm Leibniz. The New Testament prophets included Alan Turing, John von Neumann, Claude Shannon, and Norbert Wiener. They delivered the machines.

Alan Turing wondered what it would take for machines to become intelligent. John von Neumann wondered what it would take for machines to self-reproduce. Claude Shannon wondered what it would take for machines to communicate reliably, no matter how much noise intervened. Norbert Wiener wondered how long it would take for machines to assume control.

Wiener's warnings about control systems beyond human control appeared in 1949, just as the first generation of stored-program electronic digital computers were introduced. These systems required direct supervision by human programmers, undermining his concerns. What's the problem, as long as programmers are in control of the machines? Ever since, debate over the risks of autonomous control has remained associated with the debate over the powers and limitations of digitally coded machines. Despite their astonishing powers, little real autonomy has been observed. This is a dangerous assumption. What if digital computing is being superseded by something else?

Electronics underwent two fundamental transitions over the past hundred years: from analog to digital and from vacuum tubes to solid state. That these transitions occurred together does not mean they are inextricably linked. Just as digital computation was implemented using vacuum tube components, analog computation can be implemented in solid state. Analog computation is alive and well, even though vacuum tubes are commercially extinct.

There is no precise distinction between analog and digital computing. In general, digital computing deals with integers, binary sequences, deterministic logic, and time that is idealized into discrete increments, whereas analog computing deals with real numbers, nondeterministic logic, and continuous functions, including time as it exists as a continuum in the real world.

Imagine you need to find the middle of a road. You can measure its width using any available increment and then digitally compute the middle to the nearest increment. Or you can use a piece of string as an analog computer, mapping the width of the road to the length of the string and finding the middle, without being limited to increments, by doubling the string back upon itself.

Many systems operate across both analog and digital regimes. A tree integrates a wide range of inputs as continuous functions, but if you cut down that tree, you find that it has been counting the years digitally all along.

In analog computing, complexity resides in network topology, not in code. Information is processed as continuous functions of values such as voltage and relative pulse frequency rather than by logical operations on discrete strings of bits. Digital computing, intolerant of error or ambiguity, depends upon error correction at every step along the way. Analog computing tolerates errors, allowing you to live with them.

Nature uses digital coding for the storage, replication, and recombination of sequences of nucleotides, but relies on analog computing, running on nervous systems, for intelligence and control. The genetic system in every living cell is a stored-program computer. Brains aren't.

Digital computers execute transformations between two species of bits: bits representing differences in space and bits representing differences in time. The transformations between these two forms of information, sequence and structure, are governed by the computer's programming, and as long as computers require human programmers, we retain control.

Analog computers also mediate transformations between two forms of information: structure in space and behavior in time. There is no code and no programming. Somehow—and we don't fully understand how—Nature evolved analog computers known as nervous systems, which embody information absorbed from the world. They learn. One of the things they learn is control. They learn to control their own behavior, and they learn to control their environment to the extent that they can.

Computer science has a long history—going back to before there even *was* computer science—of implementing neural networks, but for the most part these have been simulations of neural networks by digital computers, not neural networks as evolved in the wild by Nature herself. This is starting to change: from the bottom up, as the threefold drivers of drone warfare, autonomous vehicles, and cell phones push the development of neuromorphic microprocessors that implement actual neural networks, rather than simulations of neural networks, directly in silicon (and other potential substrates); and from the top down, as our largest and most successful enterprises increasingly turn to analog computation in their infiltration and control of the world.

While we argue about the intelligence of digital computers, analog computing is quietly supervening upon the digital, in the same way that analog components like vacuum tubes were repurposed to build digital computers in the aftermath of World War II. Individually deterministic finite-state processors, running finite codes, are forming large-scale, nondeterministic, non-finite-state metazoan organisms running wild in the real world. The resulting hybrid analog/digital systems treat streams of bits collectively, the way the flow of electrons is treated in a vacuum tube, rather than individually, as bits are treated by the discrete-state devices generating the flow. Bits are the new electrons. Analog is back, and its nature is to assume control.

Governing everything from the flow of goods to the flow of traffic to the flow of ideas, these systems operate statistically, as pulse-frequency coded information is processed in a neuron or a brain. The emergence of intelligence gets the attention of *Homo sapiens,* but what we should be worried about is the emergence of control.

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Imagine it is 1958 and you are trying to defend the continental United States against airborne attack. To distinguish hostile aircraft, one of the things you need, besides a network of computers and early-warning radar sites, is a map of all commercial air traffic, updated in real time. The United States built such a system and named it SAGE (Semi-Automatic Ground Environment). SAGE in turn spawned Sabre, the first integrated reservation system for booking airline travel in real time. Sabre and its progeny soon became not just a map as to what seats were available but also a system that began to control, with decentralized intelligence, where airliners would fly, and when.

But isn't there a control room somewhere, with someone at the controls? Maybe not. Say, for example, you build a system to map highway traffic in real time, simply by giving cars access to the map in exchange for reporting their own speed and location at the time. The result is a fully decentralized control system. Nowhere is there any controlling model of the system except the system itself.

Imagine it is the first decade of the 21st century and you want to track the complexity of human relationships in real time. For social life at a small college, you could construct a central database and keep it up to date, but its upkeep would become overwhelming if taken to any larger scale. Better to pass out free copies of a simple semi-autonomous code, hosted locally, and let the social network update itself. This code is executed by digital computers, but the analog computing performed by the system as a whole far exceeds the complexity of the underlying code. The resulting pulse-frequency coded model of the social graph *becomes* the social graph. It spreads wildly across the campus and then the world.

What if you wanted to build a machine to capture what everything known to the human species *means*? With Moore's Law behind you, it doesn't take too long to digitize all the information in the world. You scan every book ever printed, collect every email ever written, and gather forty-nine years of video every twenty-four hours, while tracking where people are and what they do, in real time. But how do you capture the *meaning*?

Even in the age of all things digital, this cannot be defined in any strictly logical sense, because meaning, among humans, isn't fundamentally logical. The best you can do, once you have collected all possible answers, is to invite well-defined questions and compile a pulse-frequency weighted map of how everything connects. Before you know it, your system will not only be observing and mapping the meaning of things, it will start *constructing* meaning as well. In time, it will *control* meaning, in the same way as the traffic map starts to control the flow of traffic even though no one seems to be in control.

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There are three laws of artificial intelligence. The first, known as Ashby's Law, after cybernetician W. Ross Ashby, author of *Design for a Brain*, states that any effective control system must be as complex as the system it controls.

The second law, articulated by John von Neumann, states that the defining characteristic of a complex system is that it constitutes its own simplest behavioral description. The simplest complete model of an organism is the organism itself. Trying to reduce the system's behavior to any formal description makes things more complicated, not less.

The third law states that any system simple enough to be understandable will not be complicated enough to behave intelligently, while any system complicated enough to behave intelligently will be too complicated to understand.

The Third Law offers comfort to those who believe that until we understand intelligence, we need not worry about superhuman intelligence arising among machines. But there is a loophole in the Third Law. It is entirely possible to build something without understanding it. You don't need to fully understand how a brain works in order to build one that works. This is a loophole that no amount of supervision over algorithms by programmers and their ethical advisors can ever close. Provably "good" AI is a myth. Our relationship with true AI will always be a matter of faith, not proof.

We worry too much about machine intelligence and not enough about self-reproduction, communication, and control. The next revolution in computing will be signaled by the rise of analog systems over which digital programming no longer has control. Nature's response to those who believe they can build machines to control everything will be to allow them to build a machine that controls them instead.

Dan Dennett *is the philosopher of choice in the AI community. He is perhaps best known in cognitive science for his concept of intentional systems and his model of human consciousness, which sketches a computational architecture for realizing the stream of consciousness in the massively parallel cerebral cortex. That uncompromising computationalism has been opposed by philosophers such as John Searle, David Chalmers, and the late Jerry Fodor, who have protested that the most important aspects of consciousness—intentionality and subjective qualia—cannot be computed.*

Twenty-five years ago, I was visiting Marvin Minsky, one of the original AI pioneers, and asked him about Dan. "He's our best current philosopher—the next Bertrand Russell," said Marvin, adding that unlike traditional philosophers, Dan was a student of neuroscience, linguistics, artificial intelligence, computer science, and psychology: "He's redefining and reforming the role of the philosopher. Of course, Dan doesn't understand my Society-of-Mind theory, but nobody's perfect."

Dan's view of the efforts of AI researchers to create superintelligent AIs is relentlessly levelheaded. What, me worry? In this essay, he reminds us that AIs, above all, should be regarded—and treated—as tools and not as humanoid colleagues.

He has been interested in information theory since his graduate school days at Oxford. In fact, he told me that early in his career he was keenly interested in writing a book about Wiener's cybernetic ideas. As a thinker who embraces the scientific method, one of his charms is his willingness to be wrong. Of a recent piece entitled "What Is Information?" he has announced, "I stand by it, but it's under revision. I'm already moving beyond it and realizing there's a better way of tackling some of these issues." He will most likely remain cool and collected on the subject of AI research, although he has acknowledged, often, that his own ideas evolve—as anyone's ideas should.

WHAT CAN WE DO?
Daniel C. Dennett

***Daniel C. Dennett** is University Professor and Austin B. Fletcher Professor of Philosophy and director of the Center for Cognitive Studies at Tufts University. He is the author of a dozen books, including* Consciousness Explained *and, most recently,* From Bacteria to Bach and Back: The Evolution of Minds.

Many have reflected on the irony of reading a great book when you are too young to appreciate it. Consigning a classic to the *already read* stack and thereby insulating yourself against any further influence while gleaning only a few ill-understood ideas from it is a recipe for neglect that is seldom benign. This struck me with particular force when I reread *The Human Use of Human Beings* more than sixty years after my juvenile encounter. We should all make it a regular practice to reread books from our youth, where we are apt to discover clear previews of some of our own later "discoveries" and "inventions," along with a wealth of insights to which we were bound to be impervious until our minds had been torn and tattered, exercised and enlarged by confrontations with life's problems.

Writing at a time when vacuum tubes were still the primary electronic building blocks and there were only a few actual computers in operation, Norbert Wiener imagined the future we now contend with in impressive detail and with few clear mistakes. Alan Turing's famous 1950 article "Computing Machinery and Intelligence," in the philosophy journal *Mind,* foresaw the development of AI, and so did Wiener, but Wiener saw farther and deeper, recognizing that AI would not just imitate—and replace—human beings in many intelligent activities but change human beings in the process.

> We are but whirlpools in a river of ever-flowing water. We are not stuff that abides, but patterns that perpetuate themselves. (p. 96)

When that was written, it could be comfortably dismissed as yet another bit of Heraclitean overstatement. Yeah, yeah, you can never step in the same river twice. But it contains the seeds of the revolution in outlook. Today we know how to think about complex adaptive systems, strange attractors, extended minds, and homeostasis, a change in perspective that promises to erase the "explanatory gap"[8] between mind and mechanism, spirit and matter, a gap that is still ardently defended by latter-day Cartesians who cannot bear the thought that we—we *ourselves*—are self-perpetuating patterns of information-bearing matter, not "stuff that abides." Those patterns are remarkably resilient and self-restoring but at the same time protean, opportunistic, selfish exploiters of whatever new is available to harness in their quest for perpetuation. And here is where things get dicey, as Wiener recognized. When attractive opportunities abound, we are apt to be willing to pay a little and accept some small, even trivial, cost-of-doing-business for access to new powers. And pretty soon we become so dependent on our new tools that we lose the ability to thrive without them. Options become obligatory.

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[8] Joseph Levine, "Materialism and Qualia: The Explanatory Gap," *Pacific Philosophical Quarterly* 64, pp. 354-61 (1983).

It's an old, old story, with many well-known chapters in evolutionary history. Most mammals can synthesize their own vitamin C, but primates, having opted for a diet composed largely of fruit, lost the innate ability. We are now obligate ingesters of vitamin C, but not obligate frugivores like our primate cousins, since we have opted for technology that allows us to make, and take, vitamins as needed. The self-perpetuating patterns that we call human beings are now dependent on clothes, cooked food, vitamins, vaccinations, . . . credit cards, smartphones, and the Internet. And—tomorrow if not already today—AI.

Wiener foresaw the problems that Turing and the other optimists have largely overlooked. The real danger, he said, is

> that such machines, though helpless by themselves, may be used by a human being or a block of human beings to increase their control over the rest of the race or that political leaders may attempt to control their populations by means not of machines themselves but through political techniques as narrow and indifferent to human possibility as if they had, in fact, been conceived mechanically. (p. 181)

The power, he recognized, lay primarily in the algorithms, not the hardware they run on, although the hardware of today makes practically possible algorithms that would have seemed preposterously cumbersome in Wiener's day. What can we say about these "techniques" that are "narrow and indifferent to human possibility"? They have been introduced again and again, some obviously benign, some obviously dangerous, and many in the omnipresent middle ground of controversy.

Consider a few of the skirmishes. My late friend Joe Weizenbaum, Wiener's successor as MIT's Jeremiah of hi-tech, loved to observe that credit cards, whatever their virtues, also provided an inexpensive and almost foolproof way for the government, or corporations, to track the travels and habits and desires of individuals. The anonymity of cash has been largely underappreciated, except by drug dealers and other criminals, and now it may be going extinct. This may make money laundering a more difficult technical challenge in the future, but the AI pattern finders arrayed against it have the side effect of making us all more transparent to any "block of human beings" that may "attempt to control" us.

Looking to the arts, the innovation of digital audio and video recording lets us pay a small price (in the eyes of all but the most ardent audiophiles and film lovers) when we abandon analog formats, and in return provides easy—all too easy?—reproduction of artworks with almost perfect fidelity. But there is a huge hidden cost. Orwell's Ministry of Truth is now a practical possibility. AI techniques for creating all-but-undetectable forgeries of "recordings" of encounters are now becoming available which will render obsolete the tools of investigation we have come to take for granted in the last hundred and fifty years. Will we simply abandon the brief Age of Photographic Evidence and return to the earlier world in which human memory and trust provided the gold standard, or will we develop new techniques of defense and offense in the arms race of truth? (We can imagine a return to *analog* film-exposed-to-light, kept in "tamper-proof" systems until shown to juries, etc., but how long would it be before somebody figured out a way to infect such systems with doubt? One of the disturbing lessons of recent experience is that the task of destroying a reputation for credibility is much less expensive than the task of protecting such a reputation.) Wiener saw the phenomenon at its most general: "…in the long run, there is no distinction between arming ourselves and arming our enemies." (p. 129) The Information Age is also the Dysinformation Age.

What can we do? We need to rethink our priorities with the help of the passionate but flawed analyses of Wiener, Weizenbaum, and the other serious critics of our technophilia. A key phrase, it seems to me, is Wiener's almost offhand observation, above, that "these machines" are "helpless by themselves." As I have been arguing recently, we're making tools, not colleagues, and the great danger is not appreciating the difference, which we should strive to accentuate, marking and defending it with political and legal innovations.

Perhaps the best way to see what is being missed is to note that Alan Turing himself suffered an entirely understandable failure of imagination in his formulation of the famous Turing Test. As everyone knows, it is an adaptation of his "imitation game," in which a man, hidden from view and communicating verbally with a judge, tries to convince the judge that he is in fact a woman, while a woman, also hidden and communicating with the judge, tries to convince the judge that she is the woman. Turing reasoned that this would be a demanding challenge for a man (or for a woman pretending to be a man), exploiting a wealth of knowledge about how the other sex thinks and acts, what they tend to favor or ignore. Surely (*ding!*)[9], any man who could beat a woman at being perceived to be a woman would be an intelligent agent. What Turing did not foresee is the power of deep-learning AI to acquire this wealth of information in an exploitable form *without having to understand it.* Turing imagined an astute and imaginative (and hence conscious) agent who cunningly designed his responses based on his detailed "theory" of what women are likely to do and say. Top-down intelligent design, in short. He certainly didn't think that a man, winning the imitation game, would somehow *become* a woman; he imagined that there would still be a man's consciousness guiding the show. The hidden premise in Turing's almost-argument was: Only a conscious, intelligent *agent* could devise and control a winning strategy in the imitation game. And so it was persuasive to Turing (and others, including me, still a stalwart defender of the Turing Test) to argue that a "computing machine" that could pass as human in a contest with a human might not be conscious in just the way a human being is, but would nevertheless have to be a conscious agent of *some* kind. I think this is still a defensible position—the only defensible position—but you have to understand how resourceful and ingenious a judge would have to be to expose the shallowness of the façade that a deep-learning AI (a tool, not a colleague) could present.

What Turing didn't foresee is the uncanny ability of superfast computers to sift mindlessly through Big Data, of which the Internet provides an inexhaustible supply, finding probabilistic patterns in human activity that could be used to pop "authentic"-seeming responses into the output for almost any probe a judge would think to offer. Wiener also underestimates this possibility, seeing the tell-tale weakness of a machine in not being able to

> take into account the vast range of probability that characterizes the human situation. (p.181)

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[9] The *surely alarm* (the habit of having a bell ring in your head whenever you see the word in an argument) is described and defended by me in *Intuition Pumps and Other Tools for Thinking* (2013).

But taking into account that range of probability is just where the new AI excels. The only chink in the armor of AI is that word "vast"; human possibilities, thanks to language and the culture that it spawns, are truly Vast.[10] No matter how many patterns we may find with AI in the flood of data that has so far found its way onto the Internet, there are Vastly more possibilities that have never been recorded there. Only a fraction (but not a Vanishing fraction) of the world's accumulated wisdom and design and repartee and silliness has made it onto the Internet, but probably a better tactic for the judge to adopt when confronting a candidate in the Turing Test is not to *search* for such items but to *create* them anew. AI in its current manifestations is parasitic on human intelligence. It quite indiscriminately gorges on whatever has been produced by human creators and extracts the patterns to be found there—including some of our most pernicious habits.[11] These machines do not (yet) have the goals or strategies or capacities for self-criticism and innovation to permit them to transcend their databases by reflectively thinking about their own thinking and their own goals. They are, as Wiener says, helpless, not in the sense of being *shackled* agents or *disabled* agents but in the sense of not being agents at all—not having the capacity to be "moved by reasons" (as Kant put it) presented to them. It is important that we keep it that way, which will take some doing.

One of the flaws in Weizenbaum's book *Computer Power and Human Reason,* something I tried in vain to convince him of in many hours of discussion, is that he could never decide which of two theses he wanted to defend: *AI is impossible!* or *AI is possible but evil!* He wanted to argue, with John Searle and Roger Penrose, that "Strong AI" is impossible, but there are no good arguments for that conclusion. After all, everything we now know suggests that, as I have put it, we are robots made of robots made of robots. . . down to the motor proteins and their ilk, with no magical ingredients thrown in along the way. Weizenbaum's more important and defensible message was that we should not strive to create Strong AI and should be extremely cautious about the AI systems that we can create and have already created. As one might expect, the defensible thesis is a hybrid: *AI* (Strong AI) *is possible in principle but not desirable. The AI that's practically possible is not necessarily evil—unless it is mistaken for Strong AI!*

The gap between today's systems and the science-fictional systems dominating the popular imagination is still huge, though many folks, both lay and expert, manage to underestimate it. Let's consider IBM's Watson, which can stand as a worthy landmark for our imaginations for the time being. It is the result of a very large-scale R&D process extending over many person-centuries of intelligent design, and as George Church notes in these pages, it uses thousands of times more energy than a human brain (a technological limitation that, as he also notes, may be temporary). Its victory in *Jeopardy!* was a genuine triumph, made possible by the formulaic restrictions of the *Jeopardy!* rules, but in order for it to compete, even these rules had to be revised (one of those trade-offs: you give up a little versatility, a little humanity, and get a crowd-pleasing show). Watson is not good company, in spite of misleading ads from IBM that suggest a general conversational ability, and turning Watson into a plausibly multidimensional *agent* would be like turning a hand calculator into Watson. Watson could be a useful core faculty for such an agent, but more like a cerebellum or an amygdala than a mind—at best, a special-purpose subsystem that could play a big supporting role, but not remotely up to the task of framing purposes and plans and building insightfully on its conversational experiences.

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[10] In *Darwin's Dangerous Idea,* 1995, p. 109, I coined the capitalized version, *Vast,* meaning *Very much more than ASTronomical*, and its complement, *Vanishing,* to replace the usual exaggerations *infinite* and *infinitesimal* for discussions of those possibilities that are not officially infinite but nevertheless infinite for all practical purposes.

[11] Aylin Caliskan-Islam, Joanna J. Bryson & Arvind Narayanan, "Semantics derived automatically from language corpora contain human-like biases," *Science,* 14 April 2017, 356: 6334, pp. 183-6. DOI: 10.1126/science.aal4230.

Why would we want to create a thinking, creative agent out of Watson? Perhaps Turing's brilliant idea of an operational test has lured us into a trap: the quest to create at least the illusion of a real person behind the screen, bridging the "uncanny valley." The danger, here, is that ever since Turing posed his challenge—which was, after all, a challenge to *fool* the judges—AI creators have attempted to paper over the valley with cutesy humanoid touches, Disneyfication effects that will enchant and disarm the uninitiated. Weizenbaum's ELIZA was the pioneer example of such superficial illusion-making, and it was his dismay at the ease with which his laughably simple and shallow program could persuade people they were having a serious heart-to-heart conversation that first sent him on his mission.

He was right to be worried. If there is one thing we have learned from the restricted Turing Test competitions for the Loebner Prize, it is that even very intelligent people who aren't tuned in to the possibilities and shortcuts of computer programming are readily taken in by simple tricks. The attitudes of people in AI toward these methods of dissembling at the "user interface" have ranged from contempt to celebration, with a general appreciation that the tricks are not deep but can be potent. One shift in attitude that would be very welcome is a candid acknowledgment that humanoid embellishments are *false advertising*—something to condemn, not applaud.

How could that be accomplished? Once we recognize that people are starting to make life-or-death decisions largely on the basis of "advice" from AI systems whose inner operations are unfathomable in practice, we can see a good reason why those who in any way encourage people to put more trust in these systems than they warrant should be held morally and legally accountable. AI systems are very powerful tools—so powerful that even experts will have good reason not to trust their own judgment over the "judgments" delivered by their tools. But then, if these tool users are going to benefit, financially or otherwise, from driving these tools through *terra incognita,* they need to make sure they know how to do this responsibly, with maximum control and justification. Licensing and bonding operators, just as we license pharmacists (and crane operators!) and other specialists whose errors and misjudgments can have dire consequences, can, with pressure from insurance companies and other underwriters, oblige creators of AI systems to go to extraordinary lengths to search for and reveal weaknesses and gaps in their products, and to train those entitled to operate them.

One can imagine a sort of inverted Turing Test in which the judge is on trial; until he or she can spot the weaknesses, the overstepped boundaries, the gaps in a system, no license to operate will be issued. The mental training required to achieve certification as a judge will be demanding. The urge to adopt the intentional stance, our normal tactic whenever we encounter what seems to be an intelligent agent, is almost overpoweringly strong. Indeed, the capacity to resist the allure of treating an apparent person as a person is an ugly talent, reeking of racism or species-ism. Many people would find the cultivation of such a ruthlessly skeptical approach morally repugnant, and we can anticipate that even the most proficient system-users would occasionally succumb to the temptation to "befriend" their tools, if only to assuage their discomfort with the execution of their duties. No matter how scrupulously the AI designers launder the phony "human" touches out of their wares, we can expect novel habits of thought, conversational gambits and ruses, traps and bluffs to arise in this novel setting for human action. The comically long lists of known side effects of new drugs advertised on television will be dwarfed by the obligatory revelations of the sorts of questions that can*not* be responsibly answered by particular systems, with heavy penalties for those who "overlook" flaws in their products. It is widely noted that a considerable part of the growing economic inequality in today's world is due to the wealth accumulated by digital entrepreneurs; we should enact legislation that puts their deep pockets in escrow for the public good. Some of the deepest pockets are voluntarily out in front of these obligations to serve society first and make money secondarily, but we shouldn't rely on good will alone.

We don't need artificial conscious agents. There is a surfeit of natural conscious agents, enough to handle whatever tasks should be reserved for such special and privileged entities. We need intelligent tools. Tools do not have rights, and should not have feelings that could be hurt, or be able to respond with resentment to "abuses" rained on them by inept users.[12] One of the reasons for not making artificial conscious agents is that however autonomous they might become (and in principle, they can be as autonomous, as self-enhancing or self-creating, as any person), they would not—without special provision, which might be waived—share with us natural conscious agents our vulnerability or our mortality.

I once posed a challenge to students in a seminar at Tufts I co-taught with Matthias Scheutz on artificial agents and autonomy: Give me the specs for a robot that could sign a binding contract with you—not as a surrogate for some human owner but on its own. This isn't a question of getting it to understand the clauses or manipulate a pen on a piece of paper but of having and *deserving* legal status as a morally responsible agent. Small children can't sign such contracts, nor can those disabled people whose legal status requires them to be under the care and responsibility of guardians of one sort or another. The problem for robots who might want to attain such an exalted status is that, like Superman, they are too invulnerable to be able to make a credible promise. If they were to renege, what would happen? What would be the penalty for promise-breaking? Being locked in a cell or, more plausibly, dismantled? Being locked up is barely an inconvenience for an AI unless we first install artificial wanderlust that cannot be ignored or disabled by the AI on its own (and it would be systematically difficult to make this a foolproof solution, given the presumed cunning and self-knowledge of the AI); and dismantling an AI (either a robot or a bedridden agent like Watson) is not killing it, if the information stored in its design and software is preserved. The very ease of digital recording and transmitting—the breakthrough that permits software and data to be, in effect, immortal—removes robots from the world of the vulnerable (at least robots of the usually imagined sorts, with digital software and memories). If this isn't obvious, think about how human morality would be affected if we could make "backups" of people every week, say. Diving headfirst on Saturday off a high bridge without benefit of bungee cord would be a rush that you wouldn't remember when your Friday night backup was put online Sunday morning, but you could enjoy the videotape of your apparent demise thereafter.

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[12] Joanna J. Bryson, "Robots Should Be Slaves," in *Close Engagement with Artificial Companions*, Yorick Wilks, ed., (Amsterdam, The Netherlands: John Benjamins, 2010), pp. 63-74; http://www.cs.bath.ac.uk/~jjb/ftp/Bryson-Slaves-Book09.html.

_______________, "Patiency Is Not a Virtue: AI and the Design of Ethical Systems," https://www.cs.bath.ac.uk/~jjb/ftp/Bryson-Patiency-AAAISS16.pdf.

So what we are creating are not—should not be—conscious, humanoid agents but an entirely new sort of entities, rather like oracles, with no conscience, no fear of death, no distracting loves and hates, no personality (but all sorts of foibles and quirks that would no doubt be identified as the "personality" of the system): boxes of truths (if we're lucky) almost certainly contaminated with a scattering of falsehoods. It will be hard enough learning to live with them without distracting ourselves with fantasies about the Singularity in which these AIs will enslave us, literally. The *human* use of human beings will soon be changed—once again—forever, but we can take the tiller and steer between some of the hazards if we take responsibility for our trajectory.

The roboticist **Rodney Brooks,** *featured in Errol Morris's 1997 documentary* Fast, Cheap and Out of Control *along with a lion-tamer, a topiarist, and an expert on the naked mole rat, was described by one reviewer as "smiling with a wild gleam in his eye." But that's pretty much true of most visionaries.*

A few years later in his career, Brooks, as befits one of the world's leading roboticists, suggested that "we overanthropomorphize humans, who are after all mere machines." He went on to present a warm-hearted vision of a coming AI world in which "the distinction between us and robots is going to disappear." He also admitted to something of a divided worldview. "Like a religious scientist, I maintain two sets of inconsistent beliefs and act on each of them in different circumstances," he wrote. "It is this transcendence between belief systems that I think will be what enables mankind to ultimately accept robots as emotional machines, and thereafter start to empathize with them and attribute free will, respect, and ultimately rights to them."

That was in 2002. In these pages, he takes a somewhat more jaundiced, albeit narrower, view; he is alarmed by the extent to which we have come to rely on pervasive systems that are not just exploitative but also vulnerable, as a result of the too-rapid development of software engineering—an advance that seems to have outstripped the imposition of reliably effective safeguards.

THE INHUMAN MESS OUR MACHINES HAVE GOTTEN US INTO

Rodney Brooks

***Rodney Brooks** is a computer scientist; Panasonic Professor of Robotics, emeritus, MIT; former director, MIT Computer Science Lab; and founder, chairman, and CTO of Rethink Robotics. He is the author of* Flesh and Machines.

Mathematicians and scientists are often limited in how they see the big picture, beyond their particular field, by the tools and metaphors they use in their work. Norbert Wiener is no exception, and I might guess that neither am I.

When he wrote *The Human Use of Human Beings,* Wiener was straddling the end of the era of understanding machines and animals simply as physical processes and the beginning of our current era of understanding machines and animals as computational processes. I suspect there will be future eras whose tools will look as distinct from the tools of the two eras Wiener straddled as those tools did from each other.

Wiener was a giant of the earlier era and built on the tools developed since the time of Newton and Leibniz to describe and analyze continuous processes in the physical world. In 1948 he published *Cybernetics,* a word he coined to describe the science of communication and control in both machines and animals. Today we would refer to the ideas in this book as control theory, an indispensable discipline for the design and analysis of physical machines, while mostly neglecting Wiener's claims about the science of communication. Wiener's innovations were largely driven by his work during the Second World War on mechanisms to aim and fire anti-aircraft guns. He brought mathematical rigor to the design of the sorts of technology whose design processes had been largely heuristic in nature: from the Roman waterworks through Watt's steam engine to the early development of automobiles.

One can imagine a different contingent version of our intellectual and technological history had Alan Turing and John von Neumann, both of whom made major contributions to the foundations of computing, not appeared on the scene. Turing contributed a fundamental model of computation—now known as a Turing Machine—in his paper "On Computable Numbers with an Application to the Entscheidungsproblem," written and revised in 1936 and published in 1937. In these machines, a linear tape of symbols from a finite alphabet encodes the input for a computational problem and also provides the working space for the computation. A different machine was required for each separate computational problem; later work by others would show that in one particular machine, now known as a Universal Turing Machine, an arbitrary set of computing instructions could be encoded on that same tape.

In the 1940s, von Neumann developed an abstract self-reproducing machine called a cellular automaton. In this case it occupied a finite subset of an infinite two-dimensional array of squares each containing a single symbol from a finite alphabet of twenty-nine distinct symbols—the rest of the infinite array starts out blank. The single symbols in each square change in lockstep, based on a complex but finite rule about the current symbol in that square and its immediate neighbors. Under the complex rule that von Neumann developed, most of the symbols in most of the squares stay the same and a few change at each step. So when one looks at the non-blank squares, it appears that there is a constant structure with some activity going on inside it. When von Neumann's abstract machine reproduced, it made a copy of itself in another region of the plane. Within the "machine" was a horizontal line of squares which acted as a finite linear tape, using a subset of the finite alphabet. It was the symbols in those squares that encoded the machine of which they were a part. During the machine's reproduction, the "tape" could move either left or right and was both interpreted (transcribed) as the instructions (translation) for the new "machine" being built and then copied (replicated)—with the new copy being placed inside the new machine for further reproduction. Francis Crick and James Watson later showed, in 1953, how such a tape could be instantiated in biology by a long DNA molecule with its finite alphabet of four nucleobases: guanine, cytosine, adenine, and thymine (G, C, A, and T).[13] As in von Neumann's machine, in biological reproduction the linear sequence of symbols in DNA is interpreted—through transcription into RNA molecules, which then are translated into proteins, the structures that make up a new cell—and the DNA is replicated and encased in the new cell.

A second foundational piece of work was in a 1945 "First Draft" report on the design for a digital computer, wherein von Neumann advocated for a memory that could contain both instructions and data.[14] This is now known as a von Neumann architecture computer—as distinct from a Harvard architecture computer, where there are two separate memories, one for instructions and one for data. The vast majority of computer chips built in the era of Moore's Law are based on the von Neumann architecture, including those powering our data centers, our laptops, and our smartphones. Von Neumann's digital-computer architecture is conceptually the same generalization—from early digital computers constructed with electromagnetic relays at both Harvard University and Bletchley Park—that occurs in going from a special-purpose Turing Machine to a Universal Turing Machine. Furthermore, his self-replicating automata share a fundamental similarity with both the construction of a Turing Machine and the mechanism of DNA-based reproducing biological cells. There is to this day scholarly debate over whether von Neumann saw the cross connections between these three pieces of work, Turing's and his two. Turing's revision of his paper was done while he and von Neumann were both at Princeton; indeed, after getting his PhD, Turing almost stayed on as von Neumann's postdoc.

Without Turing and von Neumann, the cybernetics of Wiener might have remained a dominant mode of thought and driver of technology for much longer than its brief moment of supremacy. In this imaginary version of history, we might well live today in an actual steam-punk world and not just get to observe its fantastical instantiations at Maker Faires!

My point is that Wiener thought about the world—physical, biological, and (in *Human Use*) sociological—in a particular way. He analyzed the world as continuous variables, as he explains in chapter 1 along with a nod to thermodynamics through an overlay of Gibbs statistics. He also shoehorns in a weak and unconvincing model of information as message-passing between and among both physical and biological entities. To me, and from today's vantage point seventy years on, his tools seem woefully inadequate for describing the mechanisms underlying biological systems, and so he missed out on how similar mechanisms might eventually be embodied in technological computational systems—as now they have been. Today's dominant technologies were developed in the world of Turing and von Neumann, rather than the world of Wiener.

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[13] "A Structure for Deoxyribose Nucleic Acid," *Nature* 171, 737–738 (1953).

[14] https://en.wikipedia.org//wiki/First_Draft_of_a_Report_on_the_EDVAC#Controversy. Von Neumann is listed as the only author, whereas others contributed to the concepts he laid out; thus credit for the architecture has gone to him alone.

In the first industrial revolution, energy from a steam engine or a water wheel was used by human workers to replace their own energy. Instead of being a source of energy for physical work, people became modulators of how a large source of energy was used. But because steam engines and water wheels had to be large to be an efficient use of capital, and because in the 18th century the only technology for spatial distribution of energy was mechanical and worked only at very short range, many workers needed to be crowded around the source of energy. Wiener correctly argues that the ability to transmit energy as electricity caused a second industrial revolution. Now the source of energy could be distant from where it was used, and from the beginning of the 20th century, manufacturing could be much more dispersed as electrical-distribution grids were built.

Wiener then argues that a further new technology, that of the nascent computational machines of his time, will provide yet another revolution. The machines he talks about seem to be both analog and (perhaps) digital in nature; and he points out, in *The Human Use of Human Beings*, that since they will be able to make decisions, both blue-collar and white-collar workers may be reduced to being mere cogs in a much bigger machine. He fears that humans might use and abuse one another through organizational structures that this capability will encourage. We have certainly seen this play out in the last sixty years, and that disruption is far from over.

However, his physics-based view of computation protected him from realizing just how bad things might get. He saw machines' ability to communicate as providing a new and more inhuman way of exerting command and control. He missed that within a few decades computation systems would become more like biological systems, and it seems, from his descriptions in chapter 10 of his own work on modeling some aspects of biology, that he woefully underappreciated the many orders of magnitude of further complexity of biology over physics. We are in a much more complex situation today than he foresaw, and I am worried that it is much more pernicious than even his worst imagined fears.

In the 1960s, computation became firmly based on the foundations set out by Turing and von Neumann, and it was digital computation, based on the idea of finite alphabets which they both used. An arbitrarily long sequence, or string, formed by characters from a finite alphabet, can be encoded as a unique integer. As with Turing Machines themselves, the formalism for computation became that of computing an integer-valued function of a single integer-valued input.

Turing and von Neumann both died in the 1950s and at that time this is how they saw computation. Neither foresaw the exponential increase in computing capability that Moore's Law would bring—nor how pervasive computing machinery would become. Nor did they foresee two developments in our modeling of computation, each of which poses a great threat to human society.

The first is rooted in the abstractions they adopted. In the fifty-year, Moore's Law–fueled race to produce software that could exploit the doubling of computer capability every two years, the typical care and certification of engineering disciplines was thrown by the wayside. Software engineering was fast and prone to failures. This rapid development of software without standards of correctness has opened up many routes to exploit von Neumann architecture's storage of data and instructions in the same memory. One of the most common routes, known as "buffer overrun," involves an input number (or long string of characters) that is bigger than the programmer expected and overflows into where the instructions are stored. By carefully designing an input number that is too big by far, someone using a piece of software can infect it with instructions not intended by the programmer, and thus change what it does. This is the basis for creating a computer virus—so named for its similarity to a biological virus. The latter injects extra DNA into a cell, and that cell's transcription and translation mechanism blindly interprets it, making proteins that may be harmful to the host cell. Furthermore, the replication mechanism for the cell takes care of multiplying the virus. Thus, a small foreign entity can take control of a much bigger entity and bend its behavior in unexpected ways.

These and other forms of digital attacks have taken the security of our everyday lives from us. We rely on computers for almost everything now. We rely on computers for our infrastructure of electricity, gas, roads, cars, trains, and airplanes; these are all vulnerable. We rely on computers for our banking, our payment of bills, our retirement accounts, our mortgages, our purchasing of goods and services—these, too, are all vulnerable. We rely on computers for our entertainment, our communications both business and personal, our physical security at home, our information about the world, and our voting systems—all vulnerable. None of this will get fixed anytime soon. In the meantime, many aspects of our society are open to vicious attacks, whether by freelancing criminals or nation-state adversaries.

The second development is that computation has gone beyond simply computing functions. Instead, programs remain online continuously, and so they can gather data about a sequence of queries. Under the Wiener/Turing/von Neumann scheme, we might think of the communication pattern for a Web browser to be:

> *User: Give me Web page A.*
> *Browser: Here is Web page A.*
> …
> *User: Give me Web page B.*
> *Browser: Here is Web page B.*

Now instead it can look like this:

> *User: Give me Web page A.*
>
> *Browser: Here is Web page A. [And I will secretly remember that you asked for Web page A.]*
>
> …
>
> *User: Give me Web page B.*
>
> *Browser: Here is Web page B. [I see a correlation between its contents and that of the earlier requested Web page A, so I will update my model of you, the user, and transmit it to the company that produced me.]*

When the machine no longer simply computes a function but instead maintains a state, it can start to make inferences about the human by the sequence of requests presented to it. And when different programs correlate across different request streams—say, correlating Web-page searches with social-media posts, or the payment for services on another platform, or the dwell time on a particular advertisement, or where the user has walked or driven with their GPS-enabled smartphone—the total systems of many programs communicating with one another and with databases leads to a whole new loss of privacy. The great exploitative leap made by so many West Coast companies has been to monetize those inferences without the knowing permission of the person generating the interactions with the computing machine platforms.

Wiener, Turing, and von Neumann could not foresee the complexity of those platforms, wherein the legal mumbo-jumbo of the terms-of-use contracts the humans willingly enter into, without an inkling of what they entail, leads them to give up rights they would never concede in a one-on-one interaction with another human being. The computation platforms have become a shield behind which some companies hide in order to inhumanly exploit others. In certain other countries, the governments carry out these manipulations, and there the goal is not profits but the suppression of dissent.

Humankind has gotten itself into a fine pickle: We are being exploited by companies that paradoxically deliver services we crave, and at the same time our lives depend on many software-enabled systems that are open to attack. Getting ourselves out of this mess will be a long-term project. It will involve engineering, legislation, and most important, moral leadership. Moral leadership is the first and biggest challenge.

I first met **Frank Wilczek** *in the 1980s, when he invited me to his home in Princeton to talk about anyons. "The address is 112 Mercer Street," he wrote. "Look for the house with no driveway." So there I was, a few hours later, in Einstein's old living room, talking to a future recipient of the Nobel Prize in physics. If Frank was as impressed as I was by the surroundings, you'd never guess it. His only comment concerned the difficulty of finding a parking place in front of a "house with no driveway."*

Unlike most theoretical physicists, Frank has long had a keen interest in AI, as witnessed in these three "Observations":

1. "Francis Crick called it 'the Astonishing Hypothesis': that consciousness, also known as Mind, is an emergent property of matter," which, if true, indicates that "all intelligence is machine intelligence. What distinguishes natural from artificial intelligence is not what it is, but only how it is made."

2. "Artificial intelligence is not the product of an alien invasion. It is an artifact of a particular human culture and reflects the values of that culture."

3. "David Hume's striking statement 'Reason Is, and Ought only to Be, the Slave of the Passions' was written in 1738 [and] was, of course, meant to apply to human reason and human passions. . . . But Hume's logical/philosophical point remains valid for AI. Simply put: Incentives, not abstract logic, drive behavior."

He notes that "the big story of the 20th and the 21st century is that [as] computing develops, we learn how to calculate the consequences of the [fundamental] laws better and better. There's also a feedback cycle: When you understand matter better, you can design better computers, which will enable you to calculate better. It's kind of an ascending helix."

Here he argues that human intelligence, for now, holds the advantage—yet our future, unbounded by our solar system and doubtless also by our galaxy, will never be realized without the help of our AIs.

THE UNITY OF INTELLIGENCE
Frank Wilczek

***Frank Wilczek** is Herman Feshbach Professor of Physics at MIT, recipient of the 2004 Nobel Prize in physics, and the author of* A Beautiful Question: Finding Nature's Deep Design.

I. A Simple Answer to Contentious Questions:

- Can an artificial intelligence be conscious?
- Can an artificial intelligence be creative?
- Can an artificial intelligence be evil?

Those questions are often posed today, both in popular media and in scientifically informed debates. But the discussions never seem to converge. Here I'll begin by answering them as follows:

Based on physiological psychology, neurobiology, and physics, it would be very surprising if the answers were not Yes, Yes, and Yes. The reason is simple, yet profound: Evidence from those fields makes it overwhelmingly likely that there is no sharp divide between natural and artificial intelligence.

In his 1994 book of that title, the renowned biologist Francis Crick proposed an "astonishing hypothesis": that mind emerges from matter. He famously claimed that mind, in all its aspects, is "no more than the behavior of a vast assembly of nerve cells and their associated molecules."

The "astonishing hypothesis" is in fact the foundation of modern neuroscience. People try to understand how minds work by understanding how brains function; and they try to understand how brains function by studying how information is encoded in electrical and chemical signals, transformed by physical processes, and used to control behavior. In that scientific endeavor, they make no allowance for extraphysical behavior. So far, in thousands of exquisite experiments, that strategy has never failed. It has never proved necessary to allow for the influence of consciousness or creativity unmoored from brain activity to explain any observed fact of psychophysics or neurobiology. No one has ever stumbled upon a power of mind which is separate from conventional physical events in biological organisms. While there are many things we do not understand about brains, and about minds, the "astonishing hypothesis" has held intact.

If we broaden our view beyond neurobiology to consider the whole range of scientific experimentation, the case becomes still more compelling. In modern physics, the foci of interest are often extremely delicate phenomena. To investigate them, experimenters must take many precautions against contamination by "noise." They often find it necessary to construct elaborate shielding against stray electric and magnetic fields; to compensate for tiny vibrations due to micro-earthquakes or passing cars; to work at extremely low temperatures and in high vacuum, and so forth. But there's a notable exception: They have never found it necessary to make allowances for what people nearby (or, for that matter, far away) are thinking. No "thought waves," separate from known physical processes yet capable of influencing physical events, seem to exist.

That conclusion, taken at face value, erases the distinction between natural and artificial intelligence. It implies that if we were to duplicate, or accurately simulate, the physical processes occurring in a brain—as, in principle, we can—and wire up its input and output to sense organs and muscles, then we would reproduce, in a physical artifact, the observed manifestations of natural intelligence. Nothing observable would be missing. As an observer, I'd have no less (and no more) reason to ascribe consciousness, creativity, or evil to that artifact than I do to ascribe those properties to its natural counterparts, like other human beings.

Thus, by combining Crick's "astonishing hypothesis" in neurobiology with powerful evidence from physics, we deduce that natural intelligence is a special case of artificial intelligence. That conclusion deserves a name, and I will call it "the astonishing corollary."

With that, we have the answer to our three questions. Since consciousness, creativity, and evil are obvious features of natural human intelligence, they are possible features of artificial intelligence.

A hundred years ago, or even fifty, to believe the hypothesis that mind emerges from matter, and to infer our corollary that natural intelligence is a special case of artificial intelligence, would have been leaps of faith. In view of the many surrounding gaps—chasms, really—in contemporary understanding of biology and physics, they were genuinely doubtful propositions. But epochal developments in those areas have changed the picture:

In biology: A century ago, not only thought but also metabolism, heredity, and perception were deeply mysterious aspects of life that defied physical explanation. Today, of course, we have extremely rich and detailed accounts of metabolism, heredity, and many aspects of perception, from the bottom up, starting at the molecular level.

In physics: After a century of quantum physics and its application to materials, physicists have discovered, over and over, how rich and strange the behavior of matter can be. Superconductors, lasers, and many other wonders demonstrate that large assemblies of molecular units, each simple in itself, can exhibit qualitatively new, "emergent" behavior, while remaining fully obedient to the laws of physics. Chemistry, including biochemistry, is a cornucopia of emergent phenomena, all now quite firmly grounded in physics. The pioneering physicist Philip Anderson, in an essay titled "More Is Different," offers a classic discussion of emergence. He begins by acknowledging that "the reductionist hypothesis [i.e., the completeness of physical explanations based on known interactions of simple parts] may still be a topic for controversy among philosophers, but among the great majority of active scientists I think it is accepted without question." But he goes on to emphasize that "[t]he behavior of large and complex aggregates of elementary particles, it turns out, is not to be understood in terms of a simple extrapolation of the properties of a few particles."[15] Each new level of size and complexity supports new forms of organization, whose patterns encode information in new ways and whose behavior is best described using new concepts.

Electronic computers are a magnificent example of emergence. Here, all the cards are on the table. Engineers routinely design, from the bottom up, based on known (and quite sophisticated) physical principles, machines that process information in extremely impressive ways. Your iPhone can beat you at chess, quickly collect and deliver information about anything, and take great pictures, too. Because the process whereby computers, smartphones, and other intelligent objects are designed and manufactured is completely transparent, there can be no doubt that their wonderful capabilities emerge from regular physical processses, which we can trace down to the level of electrons, photons, quarks, and gluons. Evidently, brute matter can get pretty smart.

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[15] *Science,* 4 August 1972, Vol. 177, No. 4047, pp. 393-96.

Let me summarize the argument. From two strongly supported hypotheses, we've drawn a straightforward conclusion:

- Human mind emerges from matter.
- Matter is what physics says it is.
- *Therefore,* the human mind emerges from physical processes we understand and can reproduce artificially.
- *Therefore,* natural intelligence is a special case of artificial intelligence.

Of course, our "astonishing corollary" could fail; the first two lines of this argument are hypotheses. But their failure would have to bring in a foundation-shattering discovery—a significant new phenomenon, with large-scale physical consequences, which takes place in unremarkable, well-studied physical circumstances (i.e., the materials, temperatures, and pressures inside human brains) yet which has somehow managed for many decades to elude determined investigators armed with sophisticated instruments. Such a discovery would be. . . astonishing.

II. The Future of Intelligence

It is part of human nature to improve on human bodies and minds. Historically, clothing, eyeglasses, and watches are examples of increasingly sophisticated augmentations that enhance our toughness, perception, and awareness. They are major improvements to the natural human endowment, whose familiarity should not blind us to their depth. Today smartphones and the Internet are bringing the human drive toward augmentation into realms more central to our identity as intelligent beings. They are giving us, in effect, quick access to a vast collective awareness and a vast collective memory.

At the same time, autonomous artificial intelligences have become world champions in a wide variety of "cerebral" games, such as chess and Go, and have taken over many sophisticated pattern-recognition tasks, such as reconstructing what happened during complex reactions at the Large Hadron Collider from a blizzard of emerging particle tracks, to find new particles; or gathering clues from fuzzy X-ray, fMRI, and other types of images, to diagnose medical problems.

Where is this drive toward self-enhancement and innovation taking us? While the precise sequence of events and the timescale over which they'll play out is impossible to predict (or, at least, beyond me), some basic considerations suggest that eventually the most powerful embodiments of mind will be quite different things from human brains as we know them today.

Consider six factors whereby information-processing technology exceeds human capabilities—vastly, qualitatively, or both:

- *Speed:* The orchestrated motion of electrons, which is the heart of modern artificial information-processing, can be much faster than the processes of diffusion and chemical change by which brains operate. Typical modern computer clock rates approach 10 gigahertz, corresponding to 10 billion operations per second. No single measure of speed applies to the bewildering variety of brain processes, but one fundamental limitation is latency of action potentials, which limits their spacing to a few 10s per second. It is probably no accident that the "frame rate," at which we can distinguish that movies are actually a sequence of stills, is about 40 per second. Thus, electronic processing is close to a billion times faster.

- *Size:* The linear dimension of a typical neuron is about 10 microns. Molecular dimensions, which set a practical limit, are about 10,000 times smaller, and artificial processing units are approaching that scale. Smallness makes communication more efficient.
- *Stability:* Whereas human memory is essentially continuous (analog), artificial memory can incorporate discrete (digital) features. Whereas analog quantities can erode, digital quantities can be stored, refreshed, and maintained with complete accuracy.
- *Duty Cycle:* Human brains grow tired with effort. They need time off to take nourishment and to sleep. They carry the burden of aging. Most profoundly: They die.
- *Modularity* (open architecture): Because artificial information processors can support precisely defined digital interfaces, they can readily assimilate new modules. Thus, if we want a computer to "see" ultraviolet or infrared or "hear" ultrasound, we can feed the output from an appropriate sensor directly into its "nervous system." The architecture of brains is much more closed and opaque, and the human immune system actively resists implants.
- *Quantum readiness*: One case of modularity deserves special mention, because of its long-term potential. Recently physicists and information scientists have come to appreciate that the principles of quantum mechanics support new computing principles, which can empower qualitatively new forms of information processing and (plausibly) new levels of intelligence. But these possibilities rely on aspects of quantum behavior which are quite delicate and seem especially unsuitable for interfacing with the warm, wet, messy enviroment of human brains.

Evidently, as platforms for intelligence, human brains are far from optimal. Still, although versatile housekeeping robots or mechanical soldiers would find ready, lucrative markets, at present there is no machine that approaches the kind of general-purpose human intelligence those applications would require. Despite their relative weakness on many fronts, human brains have some big advantages over their artificial competitors. Let me mention five:

- *Three-dimensionality:* Although, as noted, the linear dimensions of existing artificial processing units are vastly smaller than those of brains, the procedure by which they're made—centered on lithography (basically, etching)—is essentially two-dimensional. That is revealed visibly in the geometry of computer boards and chips. Of course, one can stack boards, but the spacing between layers is much larger, and communication much less efficient, than within layers. Brains make better use of all three dimensions.
- *Self-repair:* Human brains can recover from, or work around, many kinds of injuries or errors. Computers often must be repaired or rebooted externally.

- *Connectivity:* Human neurons typically support several hundred connections (synapses). Moreover, the complex pattern of these connections is very meaningful. (See our next point.) Computer units typically make only a handful of connections, in regular, fixed patterns.
- *Development* (self-assembly with interactive sculpting): The human brain grows its units by cell divisions and orchestrates them into coherent structures by movement and folding. It also proliferates an abundance of connections among the cells. An important part of its sculpting occurs through active processes during infancy and childhood, as the individual interacts with his or her environment. In this process, many connections are winnowed away, while others are strengthened, depending on their effectiveness in use. Thus, the fine structure of the brain is tuned through interaction with the external world—a rich source of information and feedback!
- *Integration* (sensors and actuators): The human brain comes equipped with a variety of sensory organs, notably including its outgrowth eyes, and with versatile actuators, including hands that build, legs that walk, and mouths that speak. Those sensors and actuators are seamlessy integrated into the brain's information-processing centers, having been honed over millions of years of natural selection. We interpret their raw signals and control their large-scale actions with minimal conscious attention. The flip side is that we don't know how we do it, and the implementation is opaque. It's proving surprisingly difficult to reach human standards on these "routine" input-output functions.

These advantages of human brains over currently engineered artifacts are profound. Human brains supply an inspiring existence proof, showing us several ways we can get more out of matter. When, if ever, will our engineering catch up?

I don't know for sure, but let me offer some informed opinions. The challenges of three-dimensionality and, to a lesser extent, self-repair don't look overwhelming. They present some tough engineering problems, but many incremental improvements are easy to imagine, and there are clear paths forward. And while the powers of human eyes, hands, and other sensory organs and actuators are wonderfully effective, their abilities are far from exhausting any physical limits. Optical systems can take pictures with higher resolution in space, time, and color, and in more regions of the electromagnetic spectrum; robots can move faster and be stronger; and so forth. In these domains, the components necessary for superhuman performance, along many axes, are already available. The bottleneck is getting information into and out of them, rapidly, in the language of the information-processing units.

And this brings us to the remaining, and I think most profound, advantages of brains over artificial devices, which stem from their connectivity and interactive development. Those two advantages are synergistic, since it is interactive development that sculpts the massively wired but sprawling structure of the infant brain, enabled by exponential growth of neurons and synapses, to get tuned into the extraordinary instrument it becomes. Computer scientists are beginning to discover the power of the brain's architecture: Neural nets, whose basic design, as their name suggests, was directly inspired by the brain's, have scored some spectacular successes in game playing and pattern recognition, as noted. But present-day engineering has nothing comparable—in the (currently) esoteric domain of self-reproducing machines—to the power and versatility of neurons and their synapses. This could become a new, great frontier of research. Here too, biology might point the way, as we come to understand biological development well enough to imitate its essence.

Altogether, the advantages of artificial over natural intelligence appear permanent, while the advantages of natural over artificial intelligence, though substantial at present, appear transient. I'd guess that it will be many decades before engineering catches up, but—barring catastrophic wars, climate change, or plagues, so that technological progress stays vigorous—few centuries.

If that's right, we can look forward to several generations during which humans, empowered and augmented by smart devices, coexist with increasingly capable autonomous AIs. There will be a complex, rapidly changing ecology of intelligence, and rapid evolution in consequence. Given the intrinsic advantages that engineered devices will eventually offer, the vanguard of that evolution will be cyborgs and superminds, rather than lightly adorned *Homo sapiens.*

Another important impetus will come from the exploration of hostile environments, both on Earth (e.g., the deep ocean) and, especially, in space. The human body is poorly adapted to conditions outside a narrow band of temperatures, pressures, and atmospheric composition. It needs a wide variety of specific, complex nutrients, and plenty of water. Also, it is not radiation-hardened. As the manned space program has amply demonstrated, it is difficult and expensive to maintain humans outside their terrestrial comfort zone. Cyborgs or autonomous AIs could be much more effective in these explorations. Quantum AIs, with their sensitivity to noise, might even be happier in the cold and dark of deep space.

In a moving passage from his 1935 novel *Odd John,* science fiction's singular genius Olaf Stapledon has his hero, a superhuman (mutant) intelligence, describe *Homo sapiens* as "the Archaeopteryx of the spirit." He says this, fondly, to his friend and biographer, who is a normal human. Archaeopteryx was a noble creature, and a bridge to greater ones.

I was introduced to **Max Tegmark** *some years ago by his MIT colleague Alan Guth, the father of the inflationary universe. A distinguished theoretical physicist and cosmologist himself, Max's principal concern nowadays is the looming existential risk posed by the creation of an AGI (artificial general intelligence—that is, one that matches human intelligence). Four years ago, Max co-founded, with Jaan Tallinn and others, the Future of Life Institute (FLI), which bills itself as "an outreach organization working to ensure that tomorrow's most powerful technologies are beneficial for humanity." While on a book tour in London, he was in the midst of planning for FLI, and he admits being driven to tears in a tube station after a trip to the London Science Museum, with its exhibitions spanning the gamut of humanity's technological achievements. Was all that impressive progress in vain?*

FLI's scientific advisory board includes Elon Musk, Frank Wilczek, George Church, Stuart Russell, and the Oxford philosopher Nick Bostrom, who dreamed up an oft-quoted Gedankenexperiment *that results in a world full of paper clips and nothing else, produced by an (apparently) well-meaning AGI who was just following orders. The Institute sponsors conferences (Puerto Rico 2015, Asilomar 2017) on AI safety issues and in 2018 instituted a grants competition focusing on research in aid of maximizing the societal benefits of AGI.*

While Max is sometimes listed—by the non-cognoscenti—on the side of the scaremongers, he believes, like Frank Wilczek, in a future that will immensely benefit from AGI if, in the attempt to create it, we can keep the human species from being sidelined.

LET'S ASPIRE TO MORE THAN MAKING OURSELVES OBSOLETE
Max Tegmark

***Max Tegmark** is an MIT physicist and AI researcher; president of the Future of Life Institute; scientific director of the Foundational Questions Institute; and the author of* Our Mathematical Universe *and* Life 3.0: Being Human in the Age of Artificial Intelligence.

Although there's great controversy about how and when AI will impact humanity, the situation is clearer from a cosmic perspective: The technology-developing life that has evolved on Earth is rushing to make itself obsolete without devoting much serious thought to the consequences. This strikes me as embarrassingly lame, given that we can create amazing opportunities for humanity to flourish like never before, if we dare to steer a more ambitious course.

13.8 billion years after its birth, our Universe has become aware of itself. On a small blue planet, tiny conscious parts of our Universe have discovered that what they once thought was the sum total of existence was a minute part of something far grander: a solar system in a galaxy in a universe with over 100 billion other galaxies, arranged into an elaborate pattern of groups, clusters, and superclusters.

Consciousness is the cosmic awakening; it transformed our Universe from a mindless zombie with no self-awareness into a living ecosystem harboring self-reflection, beauty, hope, meaning, and purpose. Had that awakening never taken place, our Universe would have been pointless—a gigantic waste of space. Should our Universe go back to sleep permanently due to some cosmic calamity or self-inflicted mishap, it will become meaningless again.

On the other hand, things could get even better. We don't yet know whether we humans are the only stargazers in the cosmos, or even the first, but we've already learned enough about our Universe to know that it has the potential to wake up much more fully than it has thus far. AI pioneers such as Norbert Wiener have taught us that a further awakening of our Universe's ability to process and experience information need not require eons of additional evolution but perhaps mere decades of human scientific ingenuity.

We may be like that first glimmer of self-awareness you experienced when you emerged from sleep this morning, a premonition of the much greater consciousness that would arrive once you opened your eyes and fully awoke. Perhaps artificial superintelligence will enable life to spread throughout the cosmos and flourish for billions or trillions of years, and perhaps this will be because of decisions we make here, on our planet, in our lifetime.

Or humanity may soon go extinct, through some self-inflicted calamity caused by the power of our technology growing faster than the wisdom with which we manage it.

The evolving debate about AI's societal impact

Many thinkers dismiss the idea of superintelligence as science fiction, because they view intelligence as something mysterious that can exist only in biological organisms—especially humans—and as fundamentally limited to what today's humans can do. But from my perspective as a physicist, intelligence is simply a certain kind of information processing performed by elementary particles moving around, and there's no law of physics that says one can't build machines more intelligent in every way than we are, and able to seed cosmic life. This suggests that we've seen just the tip of the intelligence iceberg; there's an amazing potential to unlock the full intelligence latent in nature and use it to help humanity flourish—or flounder.

Others, including some of the authors in this volume, dismiss the building of an AGI (Artificial General Intelligence—an entity able to accomplish any cognitive task at least as well as humans) not because they consider it physically impossible but because they deem it too difficult for humans to pull off in less than a century. Among professional AI researchers, both types of dismissal have become minority views because of recent breakthroughs. There is a strong expectation that AGI will be achieved within a century, and the median forecast is only decades away. A recent survey of AI researchers by Vincent Muller and Nick Bostrom concludes:

> [T]he results reveal a view among experts that AI systems will probably (over 50%) reach overall human ability by 2040-50, and very likely (with 90% probability) by 2075. From reaching human ability, it will move on to superintelligence in 2 years (10%) to 30 years (75%) thereafter.[16]

In the cosmic perspective of gigayears, it makes little difference whether AGI arrives in thirty or three hundred years, so let's focus on the implications rather than the timing.

First, we humans discovered how to replicate some natural processes with machines, making our own heat, light, and mechanical horsepower. Gradually we realized that our bodies were also machines, and the discovery of nerve cells blurred the boundary between body and mind. Finally, we started building machines that could outperform not only our muscles but our minds as well. We've now been eclipsed by machines in the performance of many narrow cognitive tasks, ranging from memorization and arithmetic to game play, and we are in the process of being overtaken in many more, from driving to investing to medical diagnosing. If the AI community succeeds in its original goal of building AGI, then we will have, by definition, been eclipsed at all cognitive tasks.

This begs many obvious questions. For example, will whoever or whatever controls the AGI control Earth? Should we aim to control superintelligent machines? If not, can we ensure that they understand, adopt, and retain human values? As Norbert Wiener put it in *The Human Use of Human Beings:*

> Woe to us if we let [the machine] decide our conduct, unless we have previously examined the laws of its action, and know fully that its conduct will be carried out on principles acceptable to us! On the other hand, the machine . . . , which can learn and can make decisions on the basis of its learning, will in no way be obliged to make such decisions as we should have made, or will be acceptable to us.

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[16] Vincent C. Müller & Nick Bostrom, "Future Progress in Artificial Intelligence: A Survey of Expert Opinion," in *Fundamental Issues of Artificial Intelligence*, Vincent C. Muller, ed. (Springer International Publishing Switzerland, 2016), pp. 555-72. https://nickbostrom.com/papers/survey.pdf.

And who are the "us"? Who should deem "such decisions . . . acceptable"? Even if future powers decide to help humans survive and flourish, how will we find meaning and purpose in our lives if we aren't needed for anything?

The debate about the societal impact of AI has changed dramatically in the last few years. In 2014, what little public talk there was of AI risk tended to be dismissed as Luddite scaremongering, for one of two logically incompatible reasons:

(1) AGI was overhyped and wouldn't happen for at least another century.

(2) AGI would probably happen sooner but was virtually guaranteed to be beneficial.

Today, talk of AI's societal impact is everywhere, and work on AI safety and AI ethics has moved into companies, universities, and academic conferences. The controversial position on AI safety research is no longer to advocate for it but to dismiss it. Whereas the open letter that emerged from the 2015 Puerto Rico AI conference (and helped mainstream AI safety) spoke only in vague terms about the importance of keeping AI beneficial, the 2017 Asilomar AI Principles (see below) had real teeth: They explicitly mention recursive self-improvement, superintelligence, and existential risk, and were signed by AI industry leaders and over a thousand AI researchers from around the world.

Nonetheless, most discussion is limited to the near-term impact of narrow AI and the broader community pays only limited attention to the dramatic transformations that AGI may soon bring to life on Earth. Why?

Why we're rushing to make ourselves obsolete, and why we avoid talking about it

First of all, there's simple economics. Whenever we figure out how to make another type of human work obsolete by building machines that do it better and cheaper, most of society gains: Those who build and use the machines make profits, and consumers get more affordable products. This will be as true of future investor AGIs and scientist AGIs as it was of weaving machines, excavators, and industrial robots. In the past, displaced workers usually found new jobs, but this basic economic incentive will remain even if that is no longer the case. The existence of affordable AGI means, by definition, that *all* jobs can be done more cheaply by machines, so anyone claiming that "people will always find new well-paying jobs" is in effect claiming that AI researchers will fail to build AGI.

Second, *Homo sapiens* is by nature curious, which will motivate the scientific quest for understanding intelligence and developing AGI even without economic incentives. Although curiosity is one of the most celebrated human attributes, it can cause problems when it fosters technology we haven't yet learned how to manage wisely. Sheer scientific curiosity without profit motive contributed to the discovery of nuclear weapons and tools for engineering pandemics, so it's not unthinkable that the old adage "Curiosity killed the cat" will turn out to apply to the human species as well.

Third, we're mortal. This explains the near unanimous support for developing new technologies that help us live longer, healthier lives, which strongly motivates current AI research. AGI can clearly aid medical research even more. Some thinkers even aspire to near immortality via cyborgization or uploading.

We're thus on the slippery slope toward AGI, with strong incentives to keep sliding downward, even though the consequence will by definition be our economic obsolescence. We will no longer be needed for anything, because all jobs can be done more efficiently by machines. The successful creation of AGI would be the biggest event in human history, so why is there so little serious discussion of what it might lead to?

Here again, the answer involves multiple reasons.

First, as Upton Sinclair famously quipped, "It is difficult to get a man to understand something, when his salary depends on his not understanding it."[17] For example, spokesmen for tech companies or university research groups often claim there are no risks attached to their activities even if they privately think otherwise. Sinclair's observation may help explain not only reactions to risks from smoking and climate change but also why some treat technology as a new religion whose central articles of faith are that more technology is always better and whose heretics are clueless scaremongering Luddites.

Second, humans have a long track record of wishful thinking, flawed extrapolation of the past, and underestimation of emerging technologies. Darwinian evolution endowed us with powerful fear of concrete threats, not of abstract threats from future technologies that are hard to visualize or even imagine. Consider trying to warn people in 1930 of a future nuclear arms race, when you couldn't show them a single nuclear explosion video and nobody even knew how to build such weapons. Even top scientists can underestimate uncertainty, making forecasts that are either too optimistic—Where are those fusion reactors and flying cars?—or too pessimistic. Ernest Rutherford, arguably the greatest nuclear physicist of his time, said in 1933—less than twenty-four hours before Leo Szilard conceived of the nuclear chain reaction—that nuclear energy was "moonshine." Essentially nobody at that time saw the nuclear arms race coming.

Third, psychologists have discovered that we tend to avoid thinking of disturbing threats when we believe there's nothing we can do about them anyway. In this case, however, there are many constructive things we can do, if we can get ourselves to start thinking about the issue.

What can we do?

I'm advocating a strategy change from *"Let's rush to build technology that makes us obsolete—what could possibly go wrong?"* to *"Let's envision an inspiring future and steer toward it."*

To motivate the effort required for steering, this strategy begins by envisioning an enticing destination. Although Hollywood's futures tend to be dystopian, the fact is that AGI can help life flourish as never before. Everything I love about civilization is the product of intelligence, so if we can amplify our own intelligence with AGI, we have the potential to solve today's and tomorrow's thorniest problems, including disease, climate change, and poverty. The more detailed we can make our shared positive visions for the future, the more motivated we will be to work together to realize them.

What should we do in terms of steering? The twenty-three Asilomar principles adopted in 2017 offer plenty of guidance, including these short-term goals:

(1) An arms race in lethal autonomous weapons should be avoided.

(2) The economic prosperity created by AI should be shared broadly, to benefit all of humanity.

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[17] Upton Sinclair, *I, Candidate for Governor: And How I Got Licked* (Berkeley CA: University of California Press, 1994), p. 109.

(3) Investments in AI should be accompanied by funding for research on ensuring its beneficial use. . . . How can we make future AI systems highly robust, so that they do what we want without malfunctioning or getting hacked.[18]

The first two involve not getting stuck in suboptimal Nash equilibria. An out-of-control arms race in lethal autonomous weapons that drives the price of automated anonymous assassination toward zero will be very hard to stop once it gains momentum. The second goal would require reversing the current trend in some Western countries where sectors of the population are getting poorer in absolute terms, fueling anger, resentment, and polarization. Unless the third goal can be met, all the wonderful AI technology we create might harm us, either accidentally or deliberately.

AI safety research must be carried out with a strict deadline in mind: Before AGI arrives, we need to figure out how to make AI understand, adopt, and retain our goals. The more intelligent and powerful machines get, the more important it becomes to align their goals with ours. As long as we build relatively dumb machines, the question isn't whether human goals will prevail but merely how much trouble the machines can cause before we solve the goal-alignment problem. If a superintelligence is ever unleashed, however, it will be the other way around: Since intelligence is the ability to accomplish goals, a superintelligent AI is by definition much better at accomplishing its goals than we humans are at accomplishing ours, and will therefore prevail.

In other words, *the real risk with AGI isn't malice but competence*. A superintelligent AGI will be extremely good at accomplishing its goals, and if those goals aren't aligned with ours, we're in trouble. People don't think twice about flooding anthills to build hydroelectric dams, so let's not place humanity in the position of those ants. Most researchers argue that if we end up creating superintelligence, we should make sure it's what AI-safety pioneer Eliezer Yudkowsky has termed "friendly AI"—AI whose goals are in some deep sense beneficial.

The moral question of what these goals should be is just as urgent as the technical questions about goal alignment. For example, what sort of society are we hoping to create, where we find meaning and purpose in our lives even though we, strictly speaking, aren't needed? I'm often given the following glib response to this question: "*Let's build machines that are smarter than us and then let them figure out the answer!*" This mistakenly equates intelligence with morality. Intelligence isn't good or evil but morally neutral. It's simply an ability to accomplish complex goals, good or bad. We can't conclude that things would have been better if Hitler had been more intelligent. Indeed, postponing work on ethical issues until after goal-aligned AGI is built would be irresponsible and potentially disastrous. A perfectly obedient superintelligence whose goals automatically align with those of its human owner would be like Nazi SS-Obersturmbannführer Adolf Eichmann on steroids. Lacking moral compass or inhibitions of its own, it would, with ruthless efficiency, implement its owner's goals, whatever they might be.[19]

When I speak of the need to analyze technology risk, I'm sometimes accused of scaremongering. But here at MIT, where I work, we know that such risk analysis isn't scaremongering: It's *safety engineering*. Before the moon-landing mission, NASA systematically thought through everything that could possibly go wrong when putting astronauts on top of a 110-meter rocket full of highly flammable fuel and launching them to a place where nobody could help them—and there were lots of things that could go wrong. Was this scaremongering? No, this was the safety engineering that ensured the mission's success. Similarly, we should analyze what could go wrong with AI to ensure that it goes right.

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[18] https://futureoflife.org/ai-principles/

[19] See, for example, Hannah Arendt, *Eichmann in Jerusalem: A Report on the Banality of Evil* (New York: Penguin Classics, 2006).

Outlook

In summary, if our technology outpaces the wisdom with which we manage it, it can lead to our extinction. It's already caused the extinction of from 20 to 50 percent of all species on Earth, by some estimates,[20] and it would be ironic if we're next in line. It would also be pathetic, given that the opportunities offered by AGI are literally astronomical, potentially enabling life to flourish for billions of years not only on Earth but also throughout much of our cosmos.

Instead of squandering this opportunity through unscientific risk denial and poor planning, let's be ambitious! *Homo sapiens* is inspiringly ambitious, as reflected in William Ernest Henley's famous lines from *Invictus*: "I am the master of my fate, / I am the captain of my soul." Rather than drifting like a rudderless ship toward our own obsolescence, let's take on and overcome the technical and societal challenges standing between us and a good high-tech future. What about the existential challenges related to morality, goals, and meaning? There's no meaning encoded in the laws of physics, so instead of passively waiting for our Universe to give meaning to us, let's acknowledge and celebrate that it's we conscious beings who give meaning to our Universe. Let's create our own meaning, based on something more profound than having jobs. AGI can enable us to finally become the masters of our own destiny. Let's make that destiny a truly inspiring one!

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[20] See Elizabeth Kolbert, *The Sixth Extinction: An Unnatural History* (New York: Henry Holt, 2014).

Jaan Tallinn *grew up in Estonia, becoming one of its few computer game developers, when that nation was still a Soviet Socialist Republic. Here he compares the dissidents who brought down the Iron Curtain to the dissidents who are sounding the alarm about rapid advances in artificial intelligence. He locates the roots of the current AI dissidence, paradoxically, among such pioneers of the AI field as Wiener, Alan Turing, and I. J. Good.*

Jaan's preoccupation is with existential risk, AI being among the most extreme of many. In 2012, he co-founded the Centre for the Study of Existential Risk—an interdisciplinary research institute that works to mitigate risks "associated with emerging technologies and human activity"—at the University of Cambridge, along with philosopher Huw Price and Martin Rees, the Astronomer Royal.

He once described himself to me as "a convinced consequentialist"—convinced enough to have given away much of his entrepreneurial wealth to the Future of Life Institute (of which he is a co-founder), the Machine Intelligence Research Institute, and other such organizations working on risk reduction. Max Tegmark has written about him: "If you're an intelligent life-form reading this text millions of years from now and marveling at how life is flourishing, you may owe your existence to Jaan."

On a recent visit to London, Jaan and I participated on an AI panel for the Serpentine Gallery's Marathon at London's City Hall, under the aegis of Hans Ulrich Obrist (another contributor to this volume). This being the art world, there was a glamorous dinner party that night in a mansion filled with London's beautiful people—artists, fashion models, oligarchs, stars of stage and screen. After working the room in his unaffected manner ("Hi, I'm Jaan"), he suddenly said, "Time for hip-hop dancing," dropped to the floor on one hand, and began demonstrating his spectacular moves to the bemused A-listers. Then off he went into the dance-club subculture, which is apparently how he ends every evening when he's on the road. Who knew?

DISSIDENT MESSAGES
Jaan Tallinn

***Jaan Tallin**, a computer programmer, theoretical physicist, and investor, is a co-developer of Skype and Kazaa.*

In March 2009, I found myself in a bland franchise eatery next to a noisy California freeway. I was there to meet a young man whose blog I had been following. To make himself recognizable, he wore a button with a text on it: *Speak the truth even if your voice trembles.* His name was Eliezer Yudkowsky, and we spent the next four hours discussing the message he had for the world—a message that had brought me to that eatery and would end up dominating my subsequent work.

The First Message: the Soviet Occupation

In *The Human Use of Human Beings*, Norbert Wiener looked at the world through the lens of communication. He saw a universe that was marching to the tune of the second law of thermodynamics toward its inevitable heat death. In such a universe, the only (meta)stable entities are *messages*—patterns of information that propagate through time, like waves propagating across the surface of a lake. Even we humans can be considered messages, because the atoms in our bodies are too fleeting to attach our identities to. Instead, we are the "message" that our bodily functions maintain. As Wiener put it: "It is the pattern maintained by this homeostasis, which is the touchstone of our personal identity."

I'm more used to treating processes and computation as the fundamental building blocks of the world. That said, Wiener's lens brings out some interesting aspects of the world which might otherwise have remained in the background and which to a large degree shaped my life. These are two messages, both of which have their roots in the Second World War. They started out as quiet dissident messages—messages that people didn't pay much attention to, even if they silently and perhaps subconsciously concurred. The first message was: *The Soviet Union is composed of a series of illegitimate occupations. These occupations must end.*

As an Estonian, I grew up behind the Iron Curtain and had a front row seat when it fell. I heard this first message in the nostalgic reminiscences of my grandparents and in between the harsh noises jamming the Voice of America. It grew louder during the Gorbachev era, as the state became more lenient in its treatment of dissidents, and reached a crescendo in the Estonian Singing Revolution of the late 1980s.

In my teens, I witnessed the message spread out across widening circles of people, starting with the active dissidents, who had voiced it for half a century at great cost to themselves, proceeding to the artists and literati, and ending up among the Party members and politicians who had switched sides. This new elite comprised an eclectic mix of people: those original dissidents who had managed to survive the repression, public intellectuals, and (to the great annoyance of the surviving dissidents) even former Communists. The remaining dogmatists—even the prominent ones—were eventually marginalized, some of them retreating to Russia.

Interestingly, as the message propagated from one group to the next, it evolved. It started in pure and uncompromising form ("The occupation must end!") among the dissidents who considered the truth more important than their personal freedom. The mainstream groups, who had more to lose, initially qualified and diluted the message, taking positions like, "It would make sense in the long term to delegate control over local matters." (There were always exceptions: Some public intellectuals proclaimed the original dissident message verbatim.) Finally, the original message—being, simply, true—won out over its diluted versions. Estonia regained its independence in 1991, and the last Soviet troops left three years later.

The people who took the risk and spoke the truth in Estonia and elsewhere in the Eastern Bloc played a monumental role in the eventual outcome—an outcome that changed the lives of hundreds of millions of people, myself included. They spoke the truth, even as their voices trembled.

The Second Message: AI Risk

My exposure to the second revolutionary message was via Yudkowsky's blog—the blog that compelled me to reach out and arrange that meeting in California. The message was: *Continued progress in AI can precipitate a change of cosmic proportions—a runaway process that will likely kill everyone. We need to put in a lot of extra effort to avoid that outcome*.

After my meeting with Yudkowsky, the first thing I did was try to interest my Skype colleagues and close collaborators in his warning. I failed. The message was too crazy, too dissident. Its time had not yet come.

Only later did I learn that Yudkowsky wasn't the original dissident speaking this particular truth. In April 2000, there was a lengthy opinion piece in *Wired* titled, "Why the Future Doesn't Need Us," by Bill Joy, co-founder and chief scientist of Sun Microsystems. He warned:

> Accustomed to living with almost routine scientific breakthroughs, we have yet to come to terms with the fact that the most compelling 21st-century technologies—robotics, genetic engineering, and nanotechnology—pose a different threat than the technologies that have come before. Specifically, robots, engineered organisms, and nanobots share a dangerous amplifying factor: They can self-replicate. . . . [O]ne bot can become many, and quickly get out of control.

Apparently, Joy's broadside caused a lot of furor but little action.

More surprising to me, though, was that the AI-risk message arose almost simultaneously with the field of computer science. In a 1951 lecture, Alan Turing announced: "[I]t seems probable that once the machine thinking method had started, it would not take long to outstrip our feeble powers. . . . At some stage, therefore, we should have to expect the machines to take control. . . ."[21] A decade or so later, his Bletchley Park colleague I. J. Good wrote, "The first ultraintelligent machine is the *last* invention that man need ever make, provided that the machine is docile enough to tell us how to keep it under control."[22] Indeed, I counted half a dozen places in *The Human Use of Human Beings* where Wiener hinted at one or another aspect of the Control Problem. ("The machine like the djinnee, which can learn and can make decisions on the basis of its learning, will in no way be obliged to make such decisions as we should have made, or will be acceptable to us.") Apparently, the original dissidents promulgating the AI-risk message were the AI pioneers themselves!

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[21] Posthumously reprinted in *Phil. Math.* (3) vol. 4, 256-60 (1966).

[22] Irving John Good, "Speculations concerning the first ultraintelligent machine," *Advances in Computers,* vol. 6 (Academic Press, 1965), pp. 31-88.

Evolution's Fatal Mistake

There have been many arguments, some sophisticated and some less so, for why the Control Problem is real and not some science-fiction fantasy. Allow me to offer one that illustrates the magnitude of the problem:

For the last hundred thousand years, the world (meaning the Earth, but the argument extends to the solar system and possibly even to the entire universe) has been in the human-brain regime. In this regime, the brains of *Homo sapiens* have been the most sophisticated future-shaping mechanisms (indeed, some have called them the most complicated objects in the universe). Initially, we didn't use them for much beyond survival and tribal politics in a band of foragers, but now their effects are surpassing those of natural evolution. The planet has gone from producing forests to producing cities.

As predicted by Turing, once we have superhuman AI ("the machine thinking method"), the human-brain regime will end. Look around you—you're witnessing the final decades of a hundred-thousand-year regime. This thought alone should give people some pause before they dismiss AI as just another tool. One of the world's leading AI researchers recently confessed to me that he would be greatly relieved to learn that human-level AI was impossible for us to create.

Of course, it might still take us a long time to develop human-level AI. But we have reason to suspect that this is not the case. After all, it didn't take long, in relative terms, for evolution—the blind and clumsy optimization process—to create human-level intelligence once it had animals to work with. Or multicellular life, for that matter: Getting cells to stick together seems to have been much harder for evolution to accomplish than creating humans once there were multicellular organisms. Not to mention that our level of intelligence was limited by such grotesque factors as the width of the birth canal. Imagine an AI developer being stopped in his tracks because he couldn't manage to adjust the font size on his computer!

There's an interesting symmetry here: In fashioning humans, evolution created a system that is, at least in many important dimensions, a more powerful planner and optimizer than evolution itself is. We are the first species to understand that we're the product of evolution. Moreover, we've created many artifacts (radios, firearms, spaceships) that evolution would have little hope of creating. Our future, therefore, will be determined by our own decisions and no longer by biological evolution. In that sense, evolution has fallen victim to its own Control Problem.

We can only hope that we're smarter than evolution in that sense. We *are* smarter, of course, but will that be enough? We're about to find out.

The Present Situation

So here we are, more than half a century after the original warnings by Turing, Wiener, and Good, and a decade after people like me started paying attention to the AI-risk message. I'm glad to see that we've made a lot of progress in confronting this issue, but we're definitely not there yet. AI risk, although no longer a taboo topic, is not yet fully appreciated among AI researchers. AI risk is not yet common knowledge either. In relation to the timeline of the first dissident message, I'd say we're around the year 1988, when raising the Soviet-occupation topic was no longer a career-ending move but you still had to somewhat hedge your position. I hear similar hedging now—statements like, "I'm not concerned about superintelligent AI, but there are some real ethical issues in increased automation," or "It's good that some people are researching AI risk, but it's not a short-term concern," or even the very reasonable sounding, "These are small-probability scenarios, but their potentially high impact justifies the attention."

As far as message propagation goes, though, we are getting close to the tipping point. A recent survey of AI researchers who published at the two major international AI conferences in 2015 found that 40 percent now think that risks from highly advanced AI are either "an important problem" or "among the most important problems in the field."[23]

Of course, just as there were dogmatic Communists who never changed their position, it's all but guaranteed that some people will never admit that AI is potentially dangerous. Many of the deniers of the first kind came from the Soviet nomenklatura; similarly, the AI-risk deniers often have financial or other pragmatic motives. One of the leading motives is corporate profits. AI is profitable, and even in instances where it isn't, it's at least a trendy, forward-looking enterprise with which to associate your company. So a lot of the dismissive positions are products of corporate PR and legal machinery. In some very real sense, big corporations are nonhuman machines that pursue their own interests—interests that might not align with those of any particular human working for them. As Wiener observed in *The Human Use of Human Beings*: "When human atoms are knit into an organization in which they are used, not in their full right as responsible human beings, but as cogs and levers and rods, it matters little that their raw material is flesh and blood."

Another strong incentive to turn a blind eye to the AI risk is the (very human) curiosity that knows no bounds. "When you see something that is technically sweet, you go ahead and do it and you argue about what to do about it only after you have had your technical success. That is the way it was with the atomic bomb," said J. Robert Oppenheimer. His words were echoed recently by Geoffrey Hinton, arguably the inventor of deep learning, in the context of AI risk: "I could give you the usual arguments, but the truth is that the prospect of discovery is too sweet."

Undeniably, we have both entrepreneurial attitude and scientific curiosity to thank for almost all the nice things we take for granted in the modern era. It's important to realize, though, that progress does not *owe* us a good future. In Wiener's words, "It is possible to believe in progress as a fact without believing in progress as an ethical principle."

Ultimately, we don't have the luxury of waiting before all the corporate heads and AI researchers are willing to concede the AI risk. Imagine yourself sitting in a plane about to take off. Suddenly there's an announcement that 40 percent of the experts believe there's a bomb onboard. At that point, the course of action is already clear, and sitting there waiting for the remaining 60 percent to come around isn't part of it.

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[23] Katja Grace, et al., "When Will AI Exceed Human Performance? Evidence from AI Experts," https://arxiv.org/pdf/1705.08807.pdf.

Calibrating the AI-Risk Message

While uncannily prescient, the AI-risk message from the original dissidents has a giant flaw—as does the version dominating current public discourse: Both considerably understate the magnitude of the problem as well as AI's potential upside. The message, in other words, does not adequately convey the stakes of the game.

Wiener primarily warned of the *social* risks—risks stemming from careless integration of machine-generated decisions with governance processes and misuse (by humans) of such automated decision making. Likewise, the current "serious" debate about AI risks focuses mostly on things like technological unemployment or biases in machine learning. While such discussions can be valuable and address pressing short-term problems, they are also stunningly parochial. I'm reminded of Yudkowsky's quip in a blog post: "[A]sking about the effect of *machine superintelligence* on the conventional human labor market is like asking how US–Chinese trade patterns would be affected by the Moon crashing into the Earth. There would indeed be effects, but you'd be missing the point."

In my view, the central point of the AI risk is that *superintelligent AI is an environmental risk*. Allow me to explain.

In his "Parable of the Sentient Puddle," Douglas Adams describes a puddle that wakes up in the morning and finds himself in a hole that fits him "staggeringly well." From that observation, the puddle concludes that the world must have been made for him. Therefore, writes Adams, "the moment he disappears catches him rather by surprise." To assume that AI risks are limited to adverse social developments is to make a similar mistake. The harsh reality is that the universe was not made for us; instead, we are fine-tuned by evolution to a very narrow range of environmental parameters. For instance, we need the atmosphere at ground level to be roughly at room temperature, at about 100 kPa pressure, and have a sufficient concentration of oxygen. Any disturbance, even temporary, of this precarious equilibrium and we die in a matter of minutes.

Silicon-based intelligence does not share such concerns about the environment. That's why it's much cheaper to explore space using machine probes rather than "cans of meat." Moreover, Earth's current environment is almost certainly suboptimal for what a superintelligent AI will greatly care about: *efficient computation*. Hence we might find our planet suddenly going from anthropogenic global warming to machinogenic global cooling. One big challenge that AI safety research needs to deal with is how to constrain a potentially superintelligent AI—an AI with a much larger footprint than our own—from rendering our environment uninhabitable for biological life-forms.

Interestingly, given that the most potent sources both of AI research and AI-risk dismissals are under big corporate umbrellas, if you squint hard enough the "AI as an environmental risk" message looks like the chronic concern about corporations skirting their environmental responsibilities.

Conversely, the worry about AI's social effects also misses most of the upside. It's hard to overemphasize how tiny and parochial the future of our planet is, compared with the full potential of humanity. On astronomical timescales, our planet will be gone soon (unless we tame the sun, also a distinct possibility) and almost all the resources—atoms and free energy—to sustain civilization in the long run are in deep space.

Eric Drexler, the inventor of nanotechnology, has recently been popularizing the concept of “Pareto-topia”: the idea that AI, if done right, can bring about a future in which *everyone's* lives are hugely improved, a future where there are no losers. A key realization here is that what chiefly prevents humanity from achieving its full potential might be our instinctive sense that we're in a zero-sum game—a game in which players are supposed to eke out small wins at the expense of others. Such an instinct is seriously misguided and destructive in a “game” where everything is at stake and the payoff is literally astronomical. There are many more star systems in our galaxy alone than there are people on Earth.

Hope

As of this writing, I'm cautiously optimistic that the AI-risk message can save humanity from extinction, just as the Soviet-occupation message ended up liberating hundreds of millions of people. As of 2015, it had reached and converted 40 percent of AI researchers. It wouldn't surprise me if a new survey now would show that the majority of AI researchers believe AI safety to be an important issue.

I'm delighted to see the first technical AI-safety papers coming out of DeepMind, OpenAI, and Google Brain and the collaborative problem-solving spirit flourishing between the AI-safety research teams in these otherwise very competitive organizations.

The world's political and business elite are also slowly waking up: AI safety has been covered in reports and presentations by the Institute of Electrical and Electronics Engineers (IEEE), the World Economic Forum, and the Organization for Economic Cooperation and Development (OECD). Even the recent (July 2017) Chinese AI manifesto contained dedicated sections on “AI safety supervision” and “Develop[ing] laws, regulations, and ethical norms” and establishing “an AI security and evaluation system” to, among other things, “[e]nhance the awareness of risk.” I very much hope that a new generation of leaders who understand the AI Control Problem and AI as the ultimate environmental risk can rise above the usual tribal, zero-sum games and steer humanity past these dangerous waters we are in—thereby opening our way to the stars that have been waiting for us for billions of years.

Here's to our next hundred thousand years! And don't hesitate to speak the truth, even if your voice trembles.

Throughout his career, whether studying language, advocating a realistic biology of mind, or examining the human condition through the lens of humanistic Enlightenment ideas, psychologist **Steven Pinker** *has embraced and championed a naturalistic understanding of the universe and the computational theory of mind. He is perhaps the first internationally recognized public intellectual whose recognition is based on the advocacy of empirically based thinking about language, mind, and human nature.*

"Just as Darwin made it possible for a thoughtful observer of the natural world to do without creationism," he says, "Turing and others made it possible for a thoughtful observer of the cognitive world to do without spiritualism."

In the debate about AI risk, he argues against prophecies of doom and gloom, noting that they spring from the worst of our psychological biases—exemplified particularly by media reports: "Disaster scenarios are cheap to play out in the probability-free zone of our imaginations, and they can always find a worried, technophobic, or morbidly fascinated audience." Hence, over the centuries: Pandora, Faust, the Sorcerer's Apprentice, Frankenstein, the population bomb, resource depletion, HAL, suitcase nukes, the Y2K bug, and engulfment by nanotechnological grey goo. "A characteristic of AI dystopias," he points out, "is that they project a parochial alpha-male psychology onto the concept of intelligence. . . . History does turn up the occasional megalomaniacal despot or psychopathic serial killer, but these are products of a history of natural selection shaping testosterone-sensitive circuits in a certain species of primate, not an inevitable feature of intelligent systems."

In the present essay, he applauds Wiener's belief in the strength of ideas vis-à-vis the encroachment of technology. As Wiener so aptly put it, "The machine's danger to society is not from the machine itself but from what man makes of it."

TECH PROPHECY AND THE UNDERAPPRECIATED CAUSAL POWER OF IDEAS

Steven Pinker

Steven Pinker, *a Johnstone Family Professor in the Department of Psychology at Harvard University, is an experimental psychologist who conducts research in visual cognition, psycholinguistics, and social relations. He is the author of eleven books, including* The Blank Slate, The Better Angels of Our Nature, *and, most recently,* Enlightenment Now: The Case for Reason, Science, Humanism, and Progress.

Artificial intelligence is an existence proof of one of the great ideas in human history: that the abstract realm of knowledge, reason, and purpose does not consist of an élan vital or immaterial soul or miraculous powers of neural tissue. Rather, it can be linked to the physical realm of animals and machines via the concepts of information, computation, and control. Knowledge can be explained as patterns in matter or energy that stand in systematic relations with states of the world, with mathematical and logical truths, and with one another. Reasoning can be explained as transformations of that knowledge by physical operations that are designed to preserve those relations. Purpose can be explained as the control of operations to effect changes in the world, guided by discrepancies between its current state and a goal state. Naturally evolved brains are just the most familiar systems that achieve intelligence through information, computation, and control. Humanly designed systems that achieve intelligence vindicate the notion that information processing is sufficient to explain it—the notion that the late Jerry Fodor dubbed the computational theory of mind.

The touchstone for this volume, Norbert Wiener's *The Human Use of Human Beings,* celebrated this intellectual accomplishment, of which Wiener himself was a foundational contributor. A potted history of the mid-20th-century revolution that gave the world the computational theory of mind might credit Claude Shannon and Warren Weaver for explaining knowledge and communication in terms of information. It might credit Alan Turing and John von Neumann for explaining intelligence and reasoning in terms of computation. And it ought to give Wiener credit for explaining the hitherto mysterious world of purposes, goals, and teleology in terms of the technical concepts of feedback, control, and cybernetics (in its original sense of "governing" the operation of a goal-directed system). "It is my thesis," he announced, "that the physical functioning of the living individual and the operation of some of the newer communication machines are precisely parallel in their analogous attempts to control entropy through feedback"—the staving off of life-sapping entropy being the ultimate goal of human beings.

Wiener applied the ideas of cybernetics to a third system: society. The laws, norms, customs, media, forums, and institutions of a complex community could be considered channels of information propagation and feedback that allow a society to ward off disorder and pursue certain goals. This is a thread that runs through the book and which Wiener himself may have seen as its principal contribution. In his explanation of feedback, he wrote, "This complex of behavior is ignored by the average man, and in particular does not play the role that it should in our habitual analysis of society; for just as individual physical responses may be seen from this point of view, so may the organic responses of society itself."

Indeed, Wiener gave scientific teeth to the idea that in the workings of history, politics, and society, *ideas matter*. Beliefs, ideologies, norms, laws, and customs, by regulating the behavior of the humans who share them, can shape a society and power the course of historical events as surely as the phenomena of physics affect the structure and evolution of the solar system. To say that ideas—and not just weather, resources, geography, or weaponry—can shape history is not woolly mysticism. It is a statement of the causal powers of information instantiated in human brains and exchanged in networks of communication and feedback. Deterministic theories of history, whether they identify the causal engine as technological, climatological, or geographic, are belied by the causal power of ideas. The effects of these ideas can include unpredictable lurches and oscillations that arise from positive feedback or from miscalibrated negative feedback.

An analysis of society in terms of its propagation of ideas also gave Wiener a guideline for social criticism. A healthy society—one that gives its members the means to pursue life in defiance of entropy—allows information sensed and contributed by its members to feed back and affect how the society is governed. A dysfunctional society invokes dogma and authority to impose control from the top down. Wiener thus described himself as "a participant in a liberal outlook," and devoted most of the moral and rhetorical energy in the book (both the 1950 and 1954 editions) to denouncing communism, fascism, McCarthyism, militarism, and authoritarian religion (particularly Catholicism and Islam) and to warning that political and scientific institutions were becoming too hierarchical and insular.

Wiener's book is also, here and there, an early exemplar of an increasingly popular genre, tech prophecy. Prophecy not in the sense of mere prognostications but in the Old Testament sense of dark warnings of catastrophic payback for the decadence of one's contemporaries. Wiener warned against the accelerating nuclear arms race, against technological change that was imposed without regard to human welfare ("[W]e must know as scientists what man's nature is and what his built-in purposes are"), and against what today is called the value-alignment problem: that "the machine like the djinnee, which can learn and can make decisions on the basis of its learning, will in no way be obliged to make such decisions as we should have made, or will be acceptable to us." In the darker, 1950 edition, he warned of a "threatening new Fascism dependent on the *machine à gouverner*."

Wiener's tech prophecy harks back to the Romantic movement's rebellion against the "dark Satanic mills" of the Industrial Revolution, and perhaps even earlier, to the archetypes of Prometheus, Pandora, and Faust. And today it has gone into high gear. Jeremiahs, many of them (like Wiener) from the worlds of science and technology, have sounded alarms about nanotechnology, genetic engineering, Big Data, and particularly artificial intelligence. Several contributors to this volume characterize Wiener's book as a prescient example of tech prophecy and amplify his dire worries.

Yet the two moral themes of *The Human Use of Human Beings*—the liberal defense of an open society and the dystopian dread of runaway technology—are in tension. A society with channels of feedback that maximize human flourishing will have mechanisms in place, and can adapt them to changing circumstances, in a way that can domesticate technology to human purposes. There's nothing idealistic or mystical about this; as Wiener emphasized, ideas, norms, and institutions are themselves a form of technology, consisting of patterns of information distributed across brains. The possibility that machines threaten a new fascism must be weighed against the vigor of the liberal ideas, institutions, and norms that Wiener championed throughout the book. The flaw in today's dystopian prophecies is that they disregard the existence of these norms and institutions, or drastically underestimate their causal potency. The result is a technological determinism whose dark predictions are repeatedly refuted by the course of events. The numbers "1984" and "2001" are good reminders.

I will consider two examples. Tech prophets often warn of a "surveillance state" in which a government empowered by technology will monitor and interpret all private communications, allowing it to detect dissent and subversion as it arises and make resistance to state power futile. Orwell's telescreens are the prototype, and in 1976 Joseph Weizenbaum, one of the gloomiest tech prophets of all time, warned my class of graduate students not to pursue automatic speech recognition because government surveillance was its only conceivable application.

Though I am on record as an outspoken civil libertarian, deeply concerned with contemporary threats to free speech, I lose no sleep over technological advances in the Internet, video, or artificial intelligence. The reason is that almost all the variation across time and space in freedom of thought is driven by differences in norms and institutions and almost none of it by differences in technology. Though one can imagine hypothetical combinations of the most malevolent totalitarians with the most advanced technology, in the real world it's the norms and laws we should be vigilant about, not the tech.

Consider variation across time. If, as Orwell hinted, advancing technology was a prime enabler of political repression, then Western societies should have gotten more and more restrictive of speech over the centuries, with a dramatic worsening in the second half of the 20th century continuing into the 21st. That's not how history unfolded. It was the centuries when communication was implemented by quills and inkwells that had autos-da-fé and the jailing or guillotining of Enlightenment thinkers. During World War I, when the state of the art was the wireless, Bertrand Russell was jailed for his pacifist opinions. In the 1950s, when computers were room-size accounting machines, hundreds of liberal writers and scholars were professionally punished. Yet in the technologically accelerating, hyperconnected 21st century, 18 percent of social science professors are Marxists[24]; the President of the United States is nightly ridiculed by television comedians as a racist, pervert, and moron; and technology's biggest threat to political discourse comes from amplifying too many dubious voices rather than suppressing enlightened ones.

Now consider variations across place. Western countries at the technological frontier consistently get the highest scores in indexes of democracy and human rights, while many backward strongman states are at the bottom, routinely jailing or killing government critics. The lack of a correlation between technology and repression is unsurprising when you analyze the channels of information flow in any human society. For dissidents to be influential, they have to get their message out to a wide network via whatever channels of communication are available—pamphleteering, soap-box oration, subversive soirées in cafés and pubs, word of mouth. These channels enmesh influential dissidents in a broad social network which makes them easy to identify and track down.

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[24] Neil Gross & Solon Simmons, "The Social and Political Views of American College and University Professors," in N. Gross & S. Simmons, eds., *Professors and Their Politics* (Baltimore: Johns Hopkins University Press, 2014).

All the more so when dictators rediscover the time-honored technique of weaponizing the people against each other by punishing those who don't denounce or punish others.

In contrast, technologically advanced societies have long had the means to install Internet-connected, government-monitored surveillance cameras in every bar and bedroom. Yet that has not happened, because democratic governments (even the current American administration, with its flagrantly antidemocratic impulses) lack the will and the means to enforce such surveillance on an obstreperous people accustomed to saying what they want. Occasionally, warnings of nuclear, biological, or cyberterrorism goad government security agencies into measures such as hoovering up mobile phone metadata, but these ineffectual measures, more theater than oppression, have had no significant effect on either security or freedom. Ironically, tech prophecy plays a role in encouraging these measures. By sowing panic about supposed existential threats such as suitcase nuclear bombs and bioweapons assembled in teenagers' bedrooms, they put pressure on governments to prove they're doing something, anything, to protect the American people.

It's not that political freedom takes care of itself. It's that the biggest threats lie in the networks of ideas, norms, and institutions that allow information to feed back (or not) on collective decisions and understanding. As opposed to the chimerical technological threats, one real threat today is oppressive political correctness, which has choked the range of publicly expressible hypotheses, terrified many intelligent people against entering the intellectual arena, and triggered a reactionary backlash. Another real threat is the combination of prosecutorial discretion with an expansive lawbook filled with vague statutes. The result is that every American unwittingly commits "three felonies a day" (as the title of a book by civil libertarian Harvey Silverglate puts it) and is in jeopardy of imprisonment whenever it suits the government's needs. It's this prosecutorial weaponry that makes Big Brother all-powerful, not telescreens. The activism and polemicizing directed against government surveillance programs would be better directed at its overweening legal powers.

The other focus of much tech prophecy today is artificial intelligence, whether in the original sci-fi dystopia of computers running amok and enslaving us in an unstoppable quest for domination, or the newer version in which they subjugate us by accident, single-mindedly seeking some goal we give them regardless of its side effects on human welfare (the value-alignment problem adumbrated by Wiener). Here again both threats strike me as chimerical, growing from a narrow technological determinism that neglects the networks of information and control in an intelligent system like a computer or brain and in a society as a whole.

The subjugation fear is based on a muzzy conception of intelligence that owes more to the Great Chain of Being and a Nietzschean will to power than to a Wienerian analysis of intelligence and purpose in terms of information, computation, and control. In these horror scenarios, intelligence is portrayed as an all-powerful, wish-granting potion that agents possess in different amounts. Humans have more of it than animals, and an artificially intelligent computer or robot will have more of it than humans. Since we humans have used our moderate endowment to domesticate or exterminate less well-endowed animals (and since technologically advanced societies have enslaved or annihilated technologically primitive ones), it follows that a supersmart AI would do the same to us. Since an AI will think millions of times faster than we do, and use its superintelligence to recursively improve its superintelligence, from the instant it is turned on we will be powerless to stop it.

But these scenarios are based on a confusion of intelligence with motivation—of beliefs with desires, inferences with goals, the computation elucidated by Turing and the control elucidated by Wiener. Even if we did invent superhumanly intelligent robots, why would they *want* to enslave their masters or take over the world? Intelligence is the ability to deploy novel means to attain a goal. But the goals are extraneous to the intelligence: Being smart is not the same as wanting something. It just so happens that the intelligence in *Homo sapiens* is a product of Darwinian natural selection, an inherently competitive process. In the brains of that species, reasoning comes bundled with goals such as dominating rivals and amassing resources. But it's a mistake to confuse a circuit in the limbic brain of a certain species of primate with the very nature of intelligence. There is no law of complex systems that says that intelligent agents must turn into ruthless megalomaniacs.

A second misconception is to think of intelligence as a boundless continuum of potency, a miraculous elixir with the power to solve any problem, attain any goal. The fallacy leads to nonsensical questions like when an AI will "exceed human-level intelligence," and to the image of an "artificial general intelligence" (AGI) with God-like omniscience and omnipotence. Intelligence is a contraption of gadgets: software modules that acquire, or are programmed with, knowledge of how to pursue various goals in various domains. People are equipped to find food, win friends and influence people, charm prospective mates, bring up children, move around in the world, and pursue other human obsessions and pastimes. Computers may be programmed to take on some of these problems (like recognizing faces), not to bother with others (like charming mates), and to take on still other problems that humans can't solve (like simulating the climate or sorting millions of accounting records). The problems are different, and the kinds of knowledge needed to solve them are different.

But instead of acknowledging the centrality of knowledge to intelligence, the dystopian scenarios confuse an artificial general intelligence of the future with Laplace's demon, the mythical being that knows the location and momentum of every particle in the universe and feeds them into equations for physical laws to calculate the state of everything at any time in the future. For many reasons, Laplace's demon will never be implemented in silicon. A real-life intelligent system has to acquire information about the messy world of objects and people by engaging with it one domain at a time, the cycle being governed by the pace at which events unfold in the physical world. That's one of the reasons that understanding does not obey Moore's Law: Knowledge is acquired by formulating explanations and testing them against reality, not by running an algorithm faster and faster. Devouring the information on the Internet will not confer omniscience either: Big Data is still finite data, and the universe of knowledge is infinite.

A third reason to be skeptical of a sudden AI takeover is that it takes too seriously the inflationary phase in the AI hype cycle in which we are living today. Despite the progress in machine learning, particularly multilayered artificial neural networks, current AI systems are nowhere near achieving general intelligence (if that concept is even coherent). Instead, they are restricted to problems that consist of mapping well-defined inputs to well-defined outputs in domains where gargantuan training sets are available, in which the metric for success is immediate and precise, in which the environment doesn't change, and in which no stepwise, hierarchical, or abstract reasoning is necessary. Many of the successes come not from a better understanding of the workings of intelligence but from the brute-force power of faster chips and Bigger Data, which allow the programs to be trained on millions of examples and generalize to similar new ones. Each system is an idiot savant, with little ability to leap to problems it was not set up to solve, and a brittle mastery of those it was. And to state the obvious, none of these programs has made a move toward taking over the lab or enslaving its programmers.

Even if an artificial intelligence system tried to exercise a will to power, without the cooperation of humans it would remain an impotent brain in a vat. A superintelligent system, in its drive for self-improvement, would somehow have to build the faster processors that it would run on, the infrastructure that feeds it, and the robotic effectors that connect it to the world—all impossible unless its human victims worked to give it control of vast portions of the engineered world. Of course, one can always imagine a Doomsday Computer that is malevolent, universally empowered, always on, and tamperproof. The way to deal with this threat is straightforward: Don't build one.

What about the newer AI threat, the value-alignment problem, foreshadowed in Wiener's allusions to stories of the Monkey's Paw, the genie, and King Midas, in which a wisher rues the unforeseen side effects of his wish? The fear is that we might give an AI system a goal and then helplessly stand by as it relentlessly and literal-mindedly implemented its interpretation of that goal, the rest of our interests be damned. If we gave an AI the goal of maintaining the water level behind a dam, it might flood a town, not caring about the people who drowned. If we gave it the goal of making paper clips, it might turn all the matter in the reachable universe into paper clips, including our possessions and bodies. If we asked it to maximize human happiness, it might implant us all with intravenous dopamine drips, or rewire our brains so we were happiest sitting in jars, or, if it had been trained on the concept of happiness with pictures of smiling faces, tile the galaxy with trillions of nanoscopic pictures of smiley-faces.

Fortunately, these scenarios are self-refuting. They depend on the premises that (1) humans are so gifted that they can design an omniscient and omnipotent AI, yet so idiotic that they would give it control of the universe without testing how it works; and (2) the AI would be so brilliant that it could figure out how to transmute elements and rewire brains, yet so imbecilic that it would wreak havoc based on elementary blunders of misunderstanding. The ability to choose an action that best satisfies conflicting goals is not an add-on to intelligence that engineers might forget to install and test; it *is* intelligence. So is the ability to interpret the intentions of a language user in context.

When we put aside fantasies like digital megalomania, instant omniscience, and perfect knowledge and control of every particle in the universe, artificial intelligence is like any other technology. It is developed incrementally, designed to satisfy multiple conditions, tested before it is implemented, and constantly tweaked for efficacy and safety.

The last criterion is particularly significant. The culture of safety in advanced societies is an example of the humanizing norms and feedback channels that Wiener invoked as a potent causal force and advocated as a bulwark against the authoritarian or exploitative implementation of technology. Whereas at the turn of the 20th century Western societies tolerated shocking rates of mutilation and death in industrial, domestic, and transportation accidents, over the course of the century the value of human life increased. As a result, governments and engineers used feedback from accident statistics to implement countless regulations, devices, and design changes that made technology progressively safer. The fact that some regulations (such as using a cell phone near a gas pump) are ludicrously risk-averse underscores the point that we have become a society obsessed with safety, with fantastic benefits as a result: Rates of industrial, domestic, and transportation fatalities have fallen by more than 95 (and often 99) percent since their highs in the first half of the 20th century.[25] Yet tech prophets of malevolent or oblivious artificial intelligence write as if this momentous transformation never happened and one morning engineers will hand total control of the physical world to untested machines, heedless of the human consequences.

Norbert Wiener explained ideas, norms, and institutions in terms of computational and cybernetic processes that were scientifically intelligible and causally potent. He explained human beauty and value as "a local and temporary fight against the Niagara of increasing entropy" and expressed the hope that an open society, guided by feedback on human well-being, would enhance that value. Fortunately his belief in the causal power of ideas counteracted his worries about the looming threat of technology. As he put it, "the machine's danger to society is not from the machine itself but from what man makes of it." It is only by remembering the causal power of ideas that we can accurately assess the threats and opportunities presented by artificial intelligence today.

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[25] Steven Pinker, "Safety," *Enlightenment Now: The Case for Reason, Science, Humanism, and Progress* (New York: Penguin, 2018).

The most significant developments in the sciences today (i.e., those that affect the lives of everybody on the planet) are about, informed by, or implemented through advances in software and computation. Central to the future of these developments is physicist **David Deutsch,** *the founder of the field of quantum computation, whose 1985 paper on universal quantum computers was the first full treatment of the subject; the Deutsch-Jozsa algorithm was the first quantum algorithm to demonstrate the enormous potential power of quantum computation.*

When he initially proposed it, quantum computation seemed practically impossible. But the explosion in the construction of simple quantum computers and quantum communication systems never would have taken place without his work. He has made many other important contributions in areas such as quantum cryptography and the many-worlds interpretation of quantum theory. In a philosophic paper (with Artur Ekert), he appealed to the existence of a distinctive quantum theory of computation to argue that our knowledge of mathematics is derived from, and subordinate to, our knowledge of physics (even though mathematical truth is independent of physics).

Because he has spent a good part of his working life changing people's worldviews, his recognition among his peers as an intellectual goes well beyond his scientific achievement. He argues (following Karl Popper) that scientific theories are "bold conjectures," not derived from evidence but only tested by it. His two main lines of research at the moment—qubit-field theory and constructor theory—may well yield important extensions of the computational idea.

In the following essay, he more or less aligns himself with those who see human-level artificial intelligence as promising us a better world rather than the Apocalypse. In fact, he pleads for AGI to be, in effect, given its head, free to conjecture—a proposition that several other contributors to this book would consider dangerous.

BEYOND REWARD AND PUNISHMENT
David Deutsch

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First Murderer:
We are men, my liege.
Macbeth:
Ay, in the catalogue ye go for men,
As hounds and greyhounds, mongrels, spaniels, curs,
Shoughs, water-rugs, and demi-wolves are clept
All by the name of dogs.
William Shakespeare – *Macbeth*

For most of our species' history, our ancestors were barely people. This was not due to any inadequacy in their brains. On the contrary, even before the emergence of our anatomically modern human sub-species, they were making things like clothes and campfires, using knowledge that was not in their genes. It was created in their brains by thinking, and preserved by individuals in each generation imitating their elders. Moreover, this must have been knowledge in the sense of *understanding*, because it is impossible to imitate novel complex behaviors like those without understanding what the component behaviors are for.[26]

Such knowledgeable imitation depends on successfully guessing explanations, whether verbal or not, of what the other person is trying to achieve and how each of his actions contributes to that—for instance, when he cuts a groove in some wood, gathers dry kindling to put in it, and so on.

The complex cultural knowledge that this form of imitation permitted must have been extraordinarily useful. It drove rapid evolution of anatomical changes, such as increased memory capacity and more gracile (less robust) skeletons, appropriate to an ever more technology-dependent lifestyle. No nonhuman ape today has this ability to imitate novel complex behaviors. Nor does any present-day artificial intelligence. But our pre-*sapiens* ancestors did.

Any ability based on guessing must include means of correcting one's guesses, since most guesses will be wrong at first. (There are always many more ways of being wrong than right.) Bayesian updating is inadequate, because it cannot generate novel guesses about the purpose of an action, only fine-tune—or, at best, choose among—existing ones. Creativity is needed. As the philosopher Karl Popper explained, creative criticism, interleaved with creative conjecture, is how humans learn one another's behaviors, including language, and extract meaning from one another's utterances.[27]

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[26] "Aping" (imitating certain behaviors without understanding) uses inborn hacks such as the mirror-neuron system. But behaviors imitated that way are drastically limited in complexity. See Richard Byrne, "Imitation as Behaviour Parsing," *Phil. Trans. R. Soc.,* B 358:1431, 529-36 (2003).

[27] Karl Popper, *Conjectures and Refutations* (1963).

Those are also the processes by which all new knowledge is created: They are how we innovate, make progress, and create abstract understanding for its own sake. This is human-level intelligence: thinking. It is also, or should be, the property we seek in artificial general intelligence (AGI). Here I'll reserve the term "thinking" for processes that can create understanding (explanatory knowledge). Popper's argument implies that all thinking entities—human or not, biological or artificial—must create such knowledge in fundamentally the same way. Hence understanding any of those entities requires traditionally human concepts such as culture, creativity, disobedience, and morality—which justifies using the uniform term *people* to refer to all of them.

Misconceptions about human thinking and human origins are causing corresponding misconceptions about AGI and how it might be created. For example, it is generally assumed that the evolutionary pressure that produced modern humans was provided by the benefits of having an ever greater ability to innovate. But if that were so, there would have been rapid progress as soon as thinkers existed, just as we hope will happen when we create artificial ones. If thinking had been commonly used for anything other than imitating, it would also have been used for innovation, even if only by accident, and innovation would have created opportunities for further innovation, and so on exponentially. But instead, there were hundreds of thousands of years of near stasis. Progress happened only on timescales much longer than people's lifetimes, so in a typical generation no one benefited from any progress. Therefore, the benefits of the ability to innovate can have exerted little or no evolutionary pressure during the biological evolution of the human brain. That evolution was driven by the benefits of *preserving* cultural knowledge.

Benefits to the genes, that is. Culture, in that era, was a very mixed blessing to individual people. Their cultural knowledge was indeed good enough to enable them to outclass all other large organisms (they rapidly became the top predator, etc.), even though it was still extremely crude and full of dangerous errors. But culture consists of transmissible information—memes—and meme evolution, like gene evolution, tends to favor high-fidelity transmission. And high-fidelity meme transmission necessarily entails the suppression of attempted progress. So it would be a mistake to imagine an idyllic society of hunter-gatherers, learning at the feet of their elders to recite the tribal lore by heart, being content despite their lives of suffering and grueling labor and despite expecting to die young and in agony of some nightmarish disease or parasite. Because, even if they could conceive of nothing better than such a life, those torments were the least of their troubles. For suppressing innovation in human minds (without killing them) is a trick that can be achieved only by human action, and it is an ugly business.

This has to be seen in perspective. In the civilization of the West today, we are shocked by the depravity of, for instance, parents who torture and murder their children for not faithfully enacting cultural norms. And even more by societies and subcultures where that is commonplace and considered honorable. And by dictatorships and totalitarian states that persecute and murder entire harmless populations for behaving differently. We are ashamed of our own recent past, in which it was honorable to beat children bloody for mere disobedience. And before that, to own human beings as slaves. And before that, to burn people to death for being infidels, to the applause and amusement of the public. Steven Pinker's book *The Better Angels of our Nature* contains accounts of horrendous evils that were normal in historical civilizations. Yet even they did not extinguish innovation as efficiently as it was extinguished among our forebears in prehistory for thousands of centuries.[28]

That is why I say that prehistoric people, at least, were barely people. Both before and after becoming perfectly human both physiologically and in their mental potential, they were monstrously inhuman in the actual content of their thoughts. I'm not referring to their crimes or even their cruelty as such: Those are all too human. Nor could mere cruelty have reduced progress that effectively. Things like "the thumbscrew and the stake / For the glory of the Lord" [29] were for reining in the few deviants who had somehow escaped mental standardization, which would normally have taken effect long before they were in danger of inventing heresies. From the earliest days of thinking onward, children must have been cornucopias of creative ideas and paragons of critical thought—otherwise, as I said, they could not have learned language or other complex culture. Yet, as Jacob Bronowski stressed in *The Ascent of Man*:

> For most of history, civilisations have crudely ignored that enormous potential. . . . [C]hildren have been asked simply to conform to the image of the adult. . . . The girls are little mothers in the making. The boys are little herdsmen. They even carry themselves like their parents.

But of course, they weren't just "asked" to ignore their enormous potential and conform faithfully to the image fixed by tradition: They were somehow trained to be psychologically unable to deviate from it. By now, it is hard for us even to conceive of the kind of relentless, finely tuned oppression required to reliably extinguish, in everyone, the aspiration to progress and replace it with dread and revulsion at any novel behavior. In such a culture, there can have been no morality other than conformity and obedience, no other identity than one's status in a hierarchy, no mechanisms of cooperation other than punishment and reward. So everyone had the same aspiration in life: to avoid the punishments and get the rewards. In a typical generation, no one invented anything, because no one aspired to anything new, because everyone had already despaired of improvement being possible. Not only was there no technological innovation or theoretical discovery, there were no new worldviews, styles of art, or interests that could have inspired those. By the time individuals grew up, they had in effect been reduced to AIs, programmed with the exquisite skills needed to enact that static culture and to inflict on the next generation their inability even to consider doing otherwise.

A present-day AI is not a mentally disabled AGI, so it would not be harmed by having its mental processes directed still more narrowly to meeting some predetermined criterion. "Oppressing" Siri with humiliating tasks may be weird, but it is not immoral nor does it harm Siri. On the contrary, all the effort that has ever increased the capabilities of AIs has gone into narrowing their range of potential "thoughts." For example, take chess engines. Their basic task has not changed from the outset: Any chess position has a finite tree of possible continuations; the task is to find one that leads to a predefined goal (a checkmate, or failing that, a draw). But the tree is far too big to search exhaustively. Every improvement in chess-playing AIs, between Alan Turing's first design for one in 1948 and today's, has been brought about by ingeniously confining the program's attention (or making it confine its attention) ever more narrowly to branches likely to lead to that immutable goal. Then those branches are evaluated according to that goal.

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[28] Matt Ridley, in *The Rational Optimist,* rightly stresses the positive effect of population on the rate of progress. But that has never yet been the biggest factor: Consider, say, ancient Athens versus the rest of the world at the time.

[29] Alfred, Lord Tennyson, *The Revenge* (1878).

That is a good approach to developing an AI with a fixed goal under fixed constraints. But if an AGI worked like that, the evaluation of each branch would have to constitute a prospective reward or threatened punishment. And that is diametrically the wrong approach if we're seeking a *better* goal under *unknown* constraints—which is the capability of an AGI. An AGI is certainly capable of learning to win at chess—but also of choosing not to. Or deciding in mid-game to go for the most interesting continuation instead of a winning one. Or inventing a new game. A mere AI is incapable of having any such ideas, because the capacity for considering them has been designed out of its constitution. That disability is the very means by which it plays chess.

An AGI is capable of enjoying chess, and of improving at it *because* it enjoys playing. Or of trying to win by causing an amusing configuration of pieces, as grand masters occasionally do. Or of adapting notions from its other interests to chess. In other words, it learns and plays chess by thinking some of the very thoughts that are forbidden to chess-playing AIs.

An AGI is also capable of refusing to display any such capability. And then, if threatened with punishment, of complying, or rebelling. Daniel Dennett, in his essay for this volume, suggests that punishing an AGI is impossible:

> [L]ike Superman, they are too invulnerable to be able to make a credible promise. . . . What would be the penalty for promise- breaking? Being locked in a cell or, more plausibly, dismantled?. . . The very ease of digital recording and transmitting—the breakthrough that permits software and data to be, in effect, immortal—removes robots from the world of the vulnerable. . . .

But this is not so. Digital immortality (which is on the horizon for humans, too, perhaps sooner than AGI) does not confer this sort of invulnerability. Making a (running) copy of oneself entails sharing one's possessions with it somehow—including the hardware on which the copy runs—so making such a copy is very costly for the AGI. Similarly, courts could, for instance, impose fines on a criminal AGI which would diminish its access to physical resources, much as they do for humans. Making a backup copy to evade the consequences of one's crimes is similar to what a gangster boss does when he sends minions to commit crimes and take the fall if caught: Society has developed legal mechanisms for coping with this.

But anyway, the idea that it is primarily for fear of punishment that we obey the law and keep promises effectively denies that we are moral agents. Our society could not work if that were so. No doubt there will be AGI criminals and enemies of civilization, just as there are human ones. But there is no reason to suppose that an AGI created in a society consisting primarily of decent citizens, and raised without what William Blake called "mind-forg'd manacles," will in general impose such manacles on itself (i.e., become irrational) and/or choose to be an enemy of civilization.

The moral component, the cultural component, the element of free will—all make the task of creating an AGI fundamentally different from any other programming task. It's much more akin to raising a child. Unlike all present-day computer programs, an AGI has no specifiable functionality—no fixed, testable criterion for what shall be a successful output for a given input. Having its decisions dominated by a stream of externally imposed rewards and punishments would be poison to such a program, as it is to creative thought in humans. Setting out to create a chess-playing AI is a wonderful thing; setting out to create an AGI that cannot help playing chess would be as immoral as raising a child to lack the mental capacity to choose his own path in life.

Such a person, like any slave or brainwashing victim, would be morally entitled to rebel. And sooner or later, some of them would, just as human slaves do. AGIs could be very dangerous—exactly as humans are. But people—human or AGI—who are members of an open society do not have an inherent tendency to violence. The feared robot apocalypse will be avoided by ensuring that all people have full "human" rights, as well as the same cultural membership as humans. Humans living in an open society—the only stable kind of society—choose their own rewards, internal as well as external. Their decisions are not, in the normal course of events, determined by a fear of punishment.

Current worries about rogue AGIs mirror those that have always existed about rebellious youths—namely, that they might grow up deviating from the culture's moral values. But today the source of all existential dangers from the growth of knowledge is not rebellious youths but weapons in the hands of the enemies of civilization, whether these weapons are mentally warped (or enslaved) AGIs, mentally warped teenagers, or any other weapon of mass destruction. Fortunately for civilization, the more a person's creativity is forced into a monomaniacal channel, the more it is impaired in regard to overcoming unforeseen difficulties, just as happened for thousands of centuries.

The worry that AGIs are uniquely dangerous because they could run on ever better hardware is a fallacy, since human thought will be accelerated by the same technology. We have been using tech-assisted thought since the invention of writing and tallying. Much the same holds for the worry that AGIs might get so good, qualitatively, at thinking, that humans would be to them as insects are to humans. All thinking is a form of computation, and any computer whose repertoire includes a universal set of elementary operations can emulate the computations of any other. Hence human brains can think anything that AGIs can, subject only to limitations of speed or memory capacity, both of which can be equalized by technology.

Those are the simple dos and don'ts of coping with AGIs. But how do we create an AGI in the first place? Could we cause them to evolve from a population of ape-type AIs in a virtual environment? If such an experiment succeeded, it would be the most immoral in history, for we don't know how to achieve that outcome without creating vast suffering along the way. Nor do we know how to prevent the evolution of a static culture.

Elementary introductions to computers explain them as TOM, the Totally Obedient Moron—an inspired acronym that captures the essence of all computer programs to date: They have no idea what they are doing or why. So it won't help to give AIs more and more predetermined functionalities in the hope that these will eventually constitute Generality—the elusive G in AGI. We are aiming for the opposite, a DATA: a Disobedient Autonomous Thinking Application.

How does one test for *thinking*? By the Turing Test? Unfortunately, that requires a thinking judge. One might imagine a vast collaborative project on the Internet, where an AI hones its thinking abilities in conversations with human judges and becomes an AGI. But that assumes, among other things, that the longer the judge is unsure whether the program is a person, the closer it is to being a person. There is no reason to expect that.

And how does one test for *disobedience*? Imagine Disobedience as a compulsory school subject, with daily disobedience lessons and a disobedience test at the end of term. (Presumably with extra credit for not turning up for any of that.) This is paradoxical.

So, despite its usefulness in other applications, the programming technique of defining a testable objective and training the program to meet it will have to be dropped. Indeed, I expect that *any* testing in the process of creating an AGI risks being counterproductive, even immoral, just as in the education of humans. I share Turing's supposition that we'll know an AGI when we see one, but this partial ability to recognize success won't help in creating the successful program.

In the broadest sense, a person's quest for understanding is indeed a search problem, in an abstract space of ideas far too large to be searched exhaustively. But there is no predetermined objective of this search. There is, as Popper put it, no criterion of truth, nor of probable truth, especially in regard to explanatory knowledge. Objectives are ideas like any others—created as part of the search and continually modified and improved. So inventing ways of disabling the program's access to most of the space of ideas won't help—whether that disability is inflicted with the thumbscrew and stake or a mental straitjacket. To an AGI, the whole space of ideas must be open. It should not be knowable in advance what ideas the program can never contemplate. And the ideas that the program does contemplate must be chosen by the program itself, using methods, criteria, and objectives that are also the program's own. Its choices, like an AI's, will be hard to predict without running it (we lose no generality by assuming that the program is deterministic; an AGI using a random generator would remain an AGI if the generator were replaced by a pseudo-random one), but it will have the additional property that there is no way of proving, from its initial state, what it *won't* eventually think, short of running it.

The evolution of our ancestors is the only known case of thought starting up anywhere in the universe. As I have described, something went horribly wrong, and there was no immediate explosion of innovation: Creativity was diverted into something else. Yet not into transforming the planet into paper clips (*pace* Nick Bostrom). Rather, as we should also expect if an AGI project gets that far and fails, perverted creativity was unable to solve unexpected problems. This caused stasis and worse, thus tragically delaying the transformation of anything into anything. But the Enlightenment has happened since then. We know better now.

Tom Griffiths' *approach to the AI issue of "value alignment"—the study of how, exactly, we can keep the latest of our serial models of AI from turning the planet into paper clips—is human-centered; i.e., that of a cognitive scientist, which is what he is. The key to machine learning, he believes, is, necessarily, human learning, which he studies at Princeton using mathematical and computational tools.*

Tom once remarked to me that "one of the mysteries of human intelligence is that we're able to do so much with so little." Like machines, human beings use algorithms to make decisions or solve problems; the remarkable difference lies in the human brain's overall level of success despite the comparative limits on computational resources.

The efficacy of human algorithms springs from what AI researchers refer to as "bounded optimality." As psychologist Daniel Kahneman has notably pointed out, human beings are rational only up to a point. If you were perfectly rational, you would risk dropping dead before making an important decision—whom to hire, whom to marry, and so on—depending on the number of options available for your review.

"With all of the successes of AI over the last few years, we've got good models of things like images and text, but what we're missing are good models of people," Tom says. "Human beings are still the best example we have of thinking machines. By identifying the quantity and the nature of the preconceptions that inform human cognition we can lay the groundwork for bringing computers even closer to human performance."

THE ARTIFICIAL USE OF HUMAN BEINGS
Tom Griffiths

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When you ask people to imagine a world that has successfully, beneficially incorporated advances in artificial intelligence, everybody probably comes up with a slightly different picture. Our idiosyncratic visions of the future might differ in the presence or absence of spaceships, flying cars, or humanoid robots. But one thing doesn't vary: the presence of human beings. That's certainly what Norbert Wiener imagined when he wrote about the potential of machines to improve human society by interacting with humans and helping to mediate their interactions with one another. Getting to that point doesn't just require coming up with ways to make machines smarter. It also requires a better understanding of how human minds work.

Recent advances in artificial intelligence and machine learning have resulted in systems that can meet or exceed human abilities in playing games, classifying images, or processing text. But if you want to know why the driver in front of you cut you off, why people vote against their interests, or what birthday present you should get for your partner, you're still better off asking a human than a machine. Solving those problems requires building models of human minds that can be implemented inside a computer—something that's essential not just to better integrate machines into human societies but to make sure that human societies can continue to exist.

Consider the fantasy of having an automated intelligent assistant that can take on such basic tasks as planning meals and ordering groceries. To succeed in these tasks, it needs to be able to make inferences about what you want, based on the way you behave. Although this seems simple, making inferences about the preferences of human beings can be a tricky matter. For example, having observed that the part of the meal you most enjoy is dessert, your assistant might start to plan meals consisting entirely of desserts. Or perhaps it has heard your complaints about never having enough free time and observed that looking after your dog takes up a considerable amount of that free time. Following the dessert debacle, it has also understood that you prefer meals that incorporate protein, so it might begin to research recipes that call for dog meat. It's not a long journey from examples like this to situations that begin to sound like problems for the future of humanity (all of whom are good protein sources).

Making inferences about what humans want is a prerequisite for solving the AI problem of value alignment—aligning the values of an automated intelligent system with those of a human being. Value alignment is important if we want to ensure that those automated intelligent systems have our best interests at heart. If they can't infer what we value, there's no way for them to act in support of those values—and they may well act in ways that contravene them.

Value alignment is the subject of a small but growing literature in artificial-intelligence research. One of the tools used for solving this problem is inverse-reinforcement learning. Reinforcement learning is a standard method for training intelligent machines. By associating particular outcomes with rewards, a machine-learning system can be trained to follow strategies that produce those outcomes. Wiener hinted at this idea in the 1950s, but the intervening decades have developed it into a fine art. Modern machine-learning systems can find extremely effective strategies for playing computer games—from simple arcade games to complex real-time strategy games—by applying reinforcement-learning algorithms. Inverse reinforcement learning turns this approach around: By observing the actions of an intelligent agent that has already learned effective strategies, we can infer the rewards that led to the development of those strategies.

In its simplest form, inverse reinforcement learning is something people do all the time. It's so common that we even do it unconsciously. When you see a co-worker go to a vending machine filled with potato chips and candy and buy a packet of unsalted nuts, you infer that your co-worker (1) was hungry and (2) prefers healthy food. When an acquaintance clearly sees you and then tries to avoid encountering you, you infer that there's some reason they don't want to talk to you. When an adult spends a lot of time and money in learning to play the cello, you infer that they must really like classical music—whereas inferring the motives of a teenage boy learning to play an electric guitar might be more of a challenge.

Inverse reinforcement learning is a statistical problem: We have some data—the behavior of an intelligent agent—and we want to evaluate various hypotheses about the rewards underlying that behavior. When faced with this question, a statistician thinks about the generative model behind the data: What data would we expect to be generated if the intelligent agent was motivated by a particular set of rewards? Equipped with the generative model, the statistician can then work backward: What rewards would likely have caused the agent to behave in that particular way?

If you're trying to make inferences about the rewards that motivate human behavior, the generative model is really a theory of how people behave—how human minds work. Inferences about the hidden causes behind the behavior of other people reflect a sophisticated model of human nature that we all carry around in our heads. When that model is accurate, we make good inferences. When it's not, we make mistakes. For example, a student might infer that his professor is indifferent to him if the professor doesn't immediately respond to his email—a consequence of the student's failure to realize just how many emails that professor receives.

Automated intelligent systems that will make good inferences about what people want must have good generative models for human behavior: that is, good models of human cognition expressed in terms that can be implemented on a computer. Historically, the search for computational models of human cognition is intimately intertwined with the history of artificial intelligence itself. Only a few years after Norbert Wiener published *The Human Use of Human Beings*, Logic Theorist, the first computational model of human cognition and also the first artificial-intelligence system, was developed by Herbert Simon, of Carnegie Tech, and Allen Newell, of the RAND Corporation. Logic Theorist automatically produced mathematical proofs by emulating the strategies used by human mathematicians.

The challenge in developing computational models of human cognition is making models that are both accurate and generalizable. An accurate model, of course, predicts human behavior with a minimum of errors. A generalizable model can make predictions across a wide range of circumstances, including circumstances unanticipated by its creators—for instance, a good model of the Earth's climate should be able to predict the consequences of a rising global temperature even if this wasn't something considered by the scientists who designed it. However, when it comes to understanding the human mind, these two goals—accuracy and generalizability—have long been at odds with each other.

At the far extreme of generalizability are rational theories of cognition. These theories describe human behavior as a rational response to a given situation. A rational actor strives to maximize the expected reward produced by a sequence of actions—an idea widely used in economics precisely *because* it produces such generalizable predictions about human behavior. For the same reason, rationality is the standard assumption in inverse-reinforcement-learning models that try to make inferences from human behavior—perhaps with the concession that humans are not perfectly rational agents and sometimes randomly choose to act in ways unaligned with or even opposed to their best interests.

The problem with rationality as a basis for modeling human cognition is that it is not accurate. In the domain of decision making, an extensive literature—spearheaded by the work of cognitive psychologists Daniel Kahneman and Amos Tversky—has documented the ways in which people deviate from the prescriptions of rational models. Kahneman and Tversky proposed that in many situations people instead follow simple heuristics that allow them to reach good solutions at low cognitive cost but sometimes result in errors. To take one of their examples, if you ask somebody to evaluate the probability of an event, they might rely on how easy it is to generate an example of such an event from memory, consider whether they can come up with a causal story for that event's occurring, or assess how similar the event is to their expectations. Each heuristic is a reasonable strategy for avoiding complex probabilistic computations, but also results in errors. For instance, relying on the ease of generating an event from memory as a guide to its probability leads us to overestimate the chances of extreme (hence extremely memorable) events such as terrorist attacks.

Heuristics provide a more accurate model of human cognition but one that is not easily generalizable. How do we know which heuristic people might use in a particular situation? Are there other heuristics they use that we just haven't discovered yet? Knowing exactly how people will behave in a new situation is a challenge: Is this situation one in which they would generate examples from memory, come up with causal stories, or rely on similarity?

Ultimately, what we need is a way to describe how human minds work that has the generalizability of rationality and the accuracy of heuristics. One way to achieve this goal is to start with rationality and consider how to take it in a more realistic direction. A problem with using rationality as a basis for describing the behavior of any real-world agent is that, in many situations, calculating the rational action requires the agent to possess a huge amount of computational resources. It might be worth expending those resources if you're making a highly consequential decision and have a lot of time to evaluate your options, but most human decisions are made quickly and for relatively low stakes. In any situation where the time you spend making a decision is costly—at the very least because it's time you could spend doing something else—the classic notion of rationality is no longer a good prescription for how one should behave.

To develop a more realistic model of rational behavior, we need to take into account the cost of computation. Real agents need to modulate the amount of time they spend thinking by the effect the extra thought has on the results of a decision. If you're trying to choose a toothbrush, you probably don't need to consider all four thousand listings for manual toothbrushes on Amazon.com before making a purchase: You trade off the time you spend looking with the difference it makes in the quality of the outcome. This trade-off can be formalized, resulting in a model of rational behavior that artificial-intelligence researchers call "bounded optimality." The bounded-optimal agent doesn't focus on always choosing exactly the right action to take but rather on finding the right algorithm to follow in order to find the perfect balance between making mistakes and thinking too much.

Bounded optimality bridges the gap between rationality and heuristics. By describing behavior as the result of a rational choice about how much to think, it provides a generalizable theory—that is, one that can be applied in new situations. Sometimes the simple strategies that have been identified as heuristics that people follow turn out to be bounded-optimal solutions. So, rather than condemning the heuristics that people use as irrational, we can think of them as a rational response to constraints on computation.

Developing bounded optimality as a theory of human behavior is an ongoing project that my research group and others are actively pursuing. If these efforts succeed, they will provide us with the most important ingredient we need for making artificial-intelligence systems smarter when they try to interpret people's actions, by enabling a generative model for human behavior.

Taking into account the computational constraints that factor into human cognition will be particularly important as we begin to develop automated systems that aren't subject to the same constraints. Imagine a superintelligent AI system trying to figure out what people care about. Curing cancer or confirming the Riemann hypothesis, for instance, won't seem, to such an AI, like things that are all that important to us: If these solutions are obvious to the superintelligent system, it might wonder why we haven't found them ourselves, and conclude that those problems don't mean much to us. If we cared and the problems were so simple, we would have solved them already. A reasonable inference would be that we do science and math purely because we enjoy doing science and math, not because we care about the outcomes.

Anybody who has young children can appreciate the problem of trying to interpret the behavior of an agent that is subject to computational constraints different from one's own. Parents of toddlers can spend hours trying to disentangle the true motivations behind seemingly inexplicable behavior. As a father and a cognitive scientist, I found it was easier to understand the sudden rages of my two-year-old when I recognized that she was at an age where she could appreciate that different people have different desires but not that other people might not know what her own desires were. It's easy to understand, then, why she would get annoyed when people didn't do what she (apparently transparently) wanted. Making sense of toddlers requires building a cognitive model of the mind of a toddler. Superintelligent AI systems face the same challenge when trying to make sense of human behavior.

Superintelligent AI may still be a long way off. In the short term, devising better models of people can prove extremely valuable to any company that makes money by analyzing human behavior—which at this point is pretty much every company that does business on the Web. Over the last few years, significant new commercial technologies for interpreting images and text have resulted from developing good models for vision and language. Developing good models of people is the next frontier.

Of course, understanding how human minds work isn't just a way to make computers better at interacting with people. The trade-off between making mistakes and thinking too much that characterizes human cognition is a trade-off faced by any real-world intelligent agent. Human beings are an amazing example of systems that act intelligently despite significant computational constraints. We're quite good at developing strategies that allow us to solve problems pretty well without working too hard. Understanding how we do this will be a step toward making computers work smarter, not harder.

Romanian-born **Anca Dragan's** *research focuses on algorithms that will enable robots to work with, around, and in support of people. She runs the InterACT Laboratory at Berkeley, where her students work across different applications, from assistive robots to manufacturing to autonomous cars, and draw from optimal control, planning, estimation, learning, and cognitive science. Barely into her thirties herself, she has co-authored a number of papers with her veteran Berkeley colleague and mentor Stuart Russell which address various aspects of machine learning and the knotty problems of value alignment.*

She shares Stuart's preoccupation with AI safety: "An immediate risk is agents producing unwanted, surprising behavior," she told an interviewer from the Future of Life Institute. "Even if we plan to use AI for good, things can go wrong, precisely because we are bad at specifying objectives and constraints for AI agents. Their solutions are often not what we had in mind."

Her principal goal is therefore to help robots and programmers alike to overcome the many conflicts that arise because of a lack of transparency about each other's intentions. Robots, she says, need to ask us questions. They should wonder about their assignments, and they should pester their human programmers until everybody is on the same page—so as to avoid what she has euphemistically called "unexpected side effects."

PUTTING THE HUMAN INTO THE AI EQUATION
Anca Dragan

***Anca Dragan** is an assistant professor in the Department of Electrical Engineering and Computer Sciences at UC Berkeley. She co-founded and serves on the steering committee for the Berkeley AI Research (BAIR) Lab and is a co-principal investigator in Berkeley's Center for Human-Compatible AI.*

At the core of artificial intelligence is our mathematical definition of what an AI agent (a robot) is. When we define a robot, we define states, actions, and rewards. Think of a delivery robot, for instance. States are locations in the world, and actions are motions that the robot makes to get from one position to a nearby one. To enable the robot to decide on which actions to take, we define a reward function—a mapping from states and actions to scores indicating how good that action was in that state—and have the robot choose actions that accumulate the most "reward." The robot gets a high reward when it reaches its destination, and it incurs a small cost every time it moves; this reward function incentivizes the robot to get to the destination as quickly as possible. Similarly, an autonomous car might get a reward for making progress on its route and incur a cost for getting too close to other cars.

Given these definitions, a robot's job is to figure out what actions it should take in order to get the highest cumulative reward. We've been working hard in AI on enabling robots to do just that. Implicitly, we've assumed that if we're successful—if robots can take any problem definition and turn into a policy for how to act—we will get robots that are useful to people and to society.

We haven't been too wrong so far. If you want an AI that classifies cells as either cancerous or benign, or a robot that vacuums the living room rug while you're at work, we've got you covered. Some real-world problems can indeed be defined in isolation, with clear-cut states, actions, and rewards. But with increasing AI capability, the problems we want to tackle don't fit neatly into this framework. We can no longer cut off a tiny piece of the world, put it in a box, and give it to a robot. Helping people is starting to mean working in the real world, where you have to actually interact with people and reason about them. "People" will have to formally enter the AI problem definition somewhere.

Autonomous cars are already being developed. They will need to share the road with human-driven vehicles and pedestrians and learn to make the trade-off between getting us home as fast as possible and being considerate of other drivers. Personal assistants will need to figure out when and how much help we really want and what types of tasks we prefer to do on our own versus what we can relinquish control over. A DSS (Decision Support System) or a medical diagnostic system will need to explain its recommendations to us so we can understand and verify them. Automated tutors will need to determine what examples are informative or illustrative—not to their fellow machines but to us humans.

Looking further into the future, if we want highly capable AIs to be compatible with people, we can't create them in isolation from people and then try to make them compatible afterward; rather, we'll have to define "human-compatible" AI from the get-go. People can't be an afterthought.

When it comes to real robots helping real people, the standard definition of AI fails us, for two fundamental reasons: First, optimizing the robot's reward function in isolation is different from optimizing it when the robot acts around people, because people take actions too. We make decisions in service of our own interests, and these decisions dictate what actions we execute. Moreover, we reason about the robot—that is, we respond to what we think it's doing or will do and what we think its capabilities are. Whatever actions the robot decides on need to mesh well with ours. This is the *coordination problem*.

Second, it is ultimately a human who determines what the robot's reward function should be in the first place. And they are meant to incentivize robot behavior that matches what the end-user wants, what the designer wants, or what society as a whole wants. I believe that capable robots that go beyond very narrowly defined tasks will need to understand this to achieve compatibility with humans. This is the *value-alignment problem.*

The Coordination Problem: People are more than objects in the environment.

When we design robots for a particular task, it's tempting to abstract people away. A robotic personal assistant, for example, needs to know how to move to pick up objects, so we define that problem in isolation from the people for whom the robot is picking these objects up. Still, as the robot moves around, we don't want it bumping into anything, and that includes people, so we might include the physical location of the person in the definition of the robot's state. Same for cars: We don't want them colliding with other cars, so we enable them to track the positions of those other cars and assume that they'll be moving consistently in the same direction in the future. A human being, in this sense, is no different to a robot from a ball rolling on a flat surface. The ball will behave in the next few seconds the same way it behaved in the past few; it keeps rolling in the same direction at roughly the same speed. This is of course nothing like real human behavior, but such simplification enables many robots to succeed in their tasks and, for the most part, stay out of people's way. A robot in your house, for example, might see you coming down the hall, move aside to let you pass, and resume its task once you've gone by.

As robots have become more capable, though, treating people as consistently moving obstacles is starting to fall short. A human driver switching lanes won't continue in the same direction but will move straight ahead once they've made the lane change. When you reach for something, you often reach around other objects and stop when you get to the one you want. When you walk down a hallway, you have a destination in mind: You might take a right into the bedroom or a left into the living room. Relying on the assumption that we're no different from a rolling ball leads to inefficiency when the robot stays out of the way if it doesn't need to, and it can imperil the robot when the person's behavior changes. Even just to stay out of the way, robots have to be somewhat accurate at anticipating human actions. And, unlike the rolling ball, what people will do depends on what they *decide* to do. So to anticipate human actions, robots need to start understanding human decision making. And that doesn't mean assuming that human behavior is perfectly optimal; that might be enough for a chess- or Go-playing robot, but in the real world, people's decisions are less predictable than the optimal move in a board game.

This need to understand human actions and decisions applies to physical and nonphysical robots alike. If either sort bases its decision about how to act on the assumption that a human will do one thing but the human does something else, the resulting mismatch could be catastrophic. For cars, it can mean collisions. For an AI with, say, a financial or economic role, the mismatch between what it expects us to do and what we actually do could have even worse consequences.

One alternative is for the robot not to predict human actions but instead just protect against the *worst-case* human action. Often when robots do that, though, they stop being all that useful. With cars, this results in being stuck, because it makes every move too risky.

All this puts us, the AI community, into a bind. It suggests that robots will need accurate (or at least reasonable) predictive models of whatever people might decide to do. Our state definition can't just include the physical position of humans in the world. Instead, we'll also need to estimate something *internal* to people. We'll need to design robots that account for this human internal state, and that's a tall order. Luckily, people tend to give robots hints as to what their internal state is: Their ongoing actions give the robot observations (in the Bayesian inference sense) about their intentions. If we start walking toward the right side of the hallway, we're probably going to enter the next room on the right.

What makes the problem more complicated is the fact that people don't make decisions in isolation. It would be one thing if robots could predict the actions a person intends to take and simply figure out what to do in response. But unfortunately this can lead to ultra-defensive robots that confuse the heck out of people. (Think of human drivers stuck at four-way stops, for instance.) What the intent-prediction approach misses is that the moment the robot acts, that influences what actions the human starts taking.

There is a mutual influence between robots and people, one that robots will need to learn to navigate. It is not always just about the robot planning around people; people plan around the robot, too. It is important for robots to account for this when deciding which actions to take, be it on the road, in the kitchen, or even in virtual spaces, where actions might be making a purchase or adopting a new strategy. Doing so should endow robots with *coordination* strategies, enabling them to take part in the negotiations people seamlessly carry out day to day—from who goes first at an intersection or through a narrow door, to what role we each take when we collaborate on preparing breakfast, to coming to consensus on what next step to take on a project.

Finally, just as robots need to anticipate what people will do next, people need to do the same with robots. This is why transparency is important. Not only will robots need good mental models of people, but people will need good mental models of robots. The model that a person has of the robot has to go into our state definition as well, and the robot has to be aware of how its actions are changing that model. Much like the robot treating human actions as clues to human internal states, people will change their beliefs about the robot as they observe its actions. Unfortunately, the giving of clues doesn't come as naturally to robots as it does to humans; we've had a lot of practice communicating implicitly with people. But enabling robots to account for the change that their actions are causing to the person's mental model of the robot can lead to more carefully chosen actions that do give the right clues—that clearly communicate to people about the robot's intentions, its reward function, its limitations. For instance, a robot might alter its motion when carrying something heavy, to emphasize the difficulty it has in maneuvering heavy objects. The more that people know about the robot, the easier it is to coordinate with it.

Achieving action compatibility will require robots to anticipate human actions, account for how those actions will influence their own, and enable people to anticipate robot actions. Research has ,ade a degree of progress in meeting these challenges, but we still have a long way to go.

The Value Alignment Problem: People hold the key to the robot's reward function. Progress on enabling robots to optimize reward puts more burden on us, the designers, to give them the right reward to optimize in the first place. The original thought was that for any task we wanted the robot to do, we could write down a reward function that incentivizes the right behavior. Unfortunately, what often happens is that we specify some reward function and the behavior that emerges out of optimizing it isn't what we want. Intuitive reward functions, when combined with unusual instances of a task, can lead to unintuitive behavior. You reward an agent in a racing game with a score in the game, and in some cases it finds a loophole that it exploits to gain infinitely many points without actually winning the race. Stuart Russell and Peter Norvig give a beautiful example in their book *Artificial Intelligence: A Modern Approach:* rewarding a vacuuming robot for how much dust it sucks in results in the robot deciding to dump out dust so that it can suck it in again and get more reward.

In general, humans have had a notoriously difficult time specifying exactly what they want, as exemplified by all those genie legends. An AI paradigm in which robots get some externally specified reward fails when that reward is not perfectly well thought out. It may incentivize the robot to behave in the wrong way and even resist our attempts to correct its behavior, as that would lead to a lower specified reward.

A seemingly better paradigm might be for robots to optimize for what we internally want, even if we have trouble explicating it. They would use what we say and do as evidence about what we want, rather than interpreting it literally and taking it as a given. When we write down a reward function, the robot should understand that we might be wrong: that we might not have considered all facets of the task; that there's no guarantee that said reward function will *always* lead to the behavior we want. The robot should integrate what we wrote down into its understanding of what we want, but it should also have a back-and-forth with us to elicit clarifying information. It should seek our guidance, because that's the only way to optimize the true desired reward function.

Even if we give robots the ability to learn what we want, an important question remains that AI alone won't be able to answer. We can make robots try to align with a person's internal values, but there's more than one person involved here. The robot has an end-user (or perhaps a few, like a personal robot caring for a family, a car driving a few passengers to different destinations, or an office assistant for an entire team); it has a designer (or perhaps a few); and it interacts with society—the autonomous car shares the road with pedestrians, human-driven vehicles, and other autonomous cars. How to combine these people's values when they might be in conflict is an important problem we need to solve. AI research can give us the tools to combine values in any way we decide but can't make the necessary decision for us.

In short, we need to enable robots to reason about us—to see us as something more than obstacles or perfect game players. We need them to take our human nature into account, so that they are well coordinated and well aligned with us. If we succeed, we will indeed have tools that substantially increase our quality of life.

Chris Anderson's *company, 3DR, helped start the modern drone industry and now focuses on drone data software. He got his start building an open-source aerial robotics community called DIY Drones, and undertook some ill-advised early experiments, such as buzzing Lawrence Berkeley Laboratory with one of his self-flying spies. It may well have been a case of antic gene-expression, since he's descended from a founder of the American Anarchist movement. Chris ran* Wired *magazine, a go-to publication for techno-utopians and -dystopians alike, from 2001 to 2012; during his tenure it won five National Magazine Awards.*

Chris dislikes the term "roboticist" ("like any properly humbled roboticist, I don't call myself one"). He began as a physicist. "I turned out to be a bad physicist," he told me recently. "I struggled on, went to Los Alamos, and thought, 'Well maybe I'm not going to be a Nobel Prize winner, but I can still be a scientist.' All of us who were in physics and had these romantic heroes—the Feynmans, the Manhattan Project—realized that our career trajectory would at best be working on one project at CERN for fifteen years. That project would either be a failure, in which case there would be no paper, or it would be a success, in which case you'd be author #300 on the paper and become an assistant professor at Iowa State.

"Most of my classmates went to Wall Street to become quants, and to them we owe the subprime mortgage. Others went on to start the Internet. First, we built the Internet by connecting physics labs; second, we built the Web; third, we were the first to do Big Data. We had supercomputers—Crays—which were half the power of your phone now, but they were the supercomputers of the time. Meanwhile, we were reading this magazine called Wired, *which came out in 1993, and we realized that this tool we scientists use could have applications for everybody. The Internet wasn't just about scientific data, it was a mind-blowing cultural revolution. So when Conde Nast asked me to take over the magazine, I was like, 'Absolutely!' This magazine changed my life."*

He had five children by that time—video-game players—who got him into the "flying robots." He quit his day job at Wired. *The rest is Silicon Valley history.*

GRADIENT DESCENT
Chris Anderson

***Chris Anderson** is an entrepreneur; former editor-in-chief of* Wired; *co-founder and CEO of 3DR; and author of* The Long Tail, Free, *and* Makers.

Life

The mosquito first detects my scent from thirty feet away. It triggers its pursuit function, which consists of the simplest possible rules. First, move in a random direction. If the scent increases, continue moving in that direction. If the scent decreases, move in the opposite direction. If the scent is lost, move sideways until a scent is picked up again. Repeat until contact with the target is achieved.

The plume of my scent is densest next to me and disperses as it spreads, an invisible fog of particles exuded from my skin that moves like smoke with the wind. The closer to my skin, the higher the particle density; the farther away, the lower. This decrease is called a gradient, which describes any gradual transition from one level to another one—as opposed to a "step function," which describes a discrete change.

Once the mosquito follows this gradient to its source using its simple algorithm, it lands on my skin, which it senses with the heat detectors in its feet, which are attuned to another gradient—temperature. It then pushes its needle-shaped proboscis through the surface, where a third set of sensors in the tip detect yet another gradient, that of blood density. This flexible needle wriggles around under my skin until the scent of blood steers it to a capillary, which it punctures. Then my blood begins to flow into the mosquito. Mission accomplished. Ouch.

What seems like the powerful radar of insects in the dark, with blood-seeking intelligence inexplicable for such tiny brains, is actually just a sensitive nose with almost no intelligence at all. Mosquitoes are closer to plants that follow the sun than to guided missiles. Yet by applying this simple "follow your nose" rule quite literally, they can travel through a house to find you, slip through cracks in a screen door, even zero in on the tiny strip of skin you left exposed between hat and shirt collar. It's just a random walk, combined with flexible wings and legs that let the insect bounce off obstacles, and an instinct to descend a chemical gradient.

But "gradient descent" is much more than bug navigation. Look around you and you'll find it everywhere, from the most basic physical rules of the universe to the most advanced artificial intelligence.

The Universe

We live in a world of countless gradients, from light and heat to gravity and chemical trails (chemtrails!). Water flows along a gravity gradient downhill, and your body lives on chemical solutions flowing across cell membranes from high concentration to low. Every action in the universe is driven by some gradient drive, from the movement of the planets around gravity gradients to the joining of atoms along electric-charge gradients to form molecules. Our own urges, such as hunger and sleepiness, are driven by electro-chemical gradients in our bodies. And our brain's functions, the electrical signals moving along ion channels in the synapses between our neurons, are simply atoms and electrons flowing "downhill" along yet more electrical and chemical gradients.

Forget clockwork analogies; our brains are closer to a system of canals and locks, with signals traveling like water from one state to another.

As I sit here typing, I'm actually seeking equilibrium states in an *n*-dimensional topology of gradients. Take just one: heat. My body temperature is higher than the air temperature, so I radiate heat, which must be replenished in my core. Even the bacteria in my digestive tract use sensors to measure sugar concentrations in the liquid around them and whip their tail-like flagella to swim "upstream" where the sugar supply is richest. The natural state of all systems is to flow to lower energy states, a process that is broadly described by entropy (the tendency of things to go from ordered to disordered states; all things will fall apart eventually, including the universe itself).

But how do you explain more complex behavior, such as our ability to make decisions? The answer is just more gradient descent.

Our Brains

As miraculous and inscrutable as our human intelligence is, science is coming around to the view that our brains operate the same way as any other complex system with layers and feedback loops, all pursuing what we mathematically call "optimization functions" but you could just as well call "flowing downhill" in some sense.

The essence of intelligence is learning, and we do that by correlating inputs with positive or negatives scores (rewards or punishment). So, for a baby, "this sound" (your mother's voice) is associated with other learned connections to your mother, such as food or comfort. Likewise, "this muscle motion brings my thumb closer to my mouth." Over time and trial and error, the brain's neural network reinforces those connections. Meanwhile "this muscle motion does not bring my thumb close to my mouth" is a negative correlation, and the brain will weaken those connections.

However, this is too simplistic. The limits of gradient descent constitute the so-called local-minima problem (or local-maxima problem, if you're doing a gradient *ascent*). If you are walking in a mountainous region and want to get home, always walking downhill will most likely get you to the next valley but not necessarily over the other mountains that lie around it and between you and home. For that, you need either a mental model (i.e., a map) of the topology so you know where to ascend to get out of the valley, or you need to switch between gradient descent and random walks so you can bounce your way out of the region.

Which is, in fact, exactly what the mosquito does in following my scent: It descends when it's in my plume and random-walks when it has lost the trail or hit an obstacle.

AI

So that's nature. What about computers? Traditional software doesn't work that way—it follows deterministic trees of hard logic: "If this, do that." But software that interacts with the physical world tends to work more *like* the physical world. That means dealing with noisy inputs (sensors or human behavior) and providing probabilistic, not deterministic, results. And that, in turn, means more gradient descent.

AI software is the best example of this, especially the kinds of AI that use artificial neural-network models (including convolutional, or "deep," neural networks of many layers). In these, a typical process consists of "training" them by showing them lots of examples of something you want them to learn (pictures of cats labeled "cat," for example), along with examples of other random data (pictures of other things). This is called "supervised learning," because the neural network is being taught by example, including the use of "adversarial training" with data that is not correlated to the desired result.

These neural networks, like their biological models, consist of layers of thousands of nodes ("neurons," in the analogy), each of which is connected to all the nodes in the layers above and below by connections that initially have random strength. The top layer is presented with data, and the bottom layer is given the correct answer. Any series of connections that happened to land on the right answer is made stronger ("rewarded"), and those that were wrong are made weaker ("punished"). Repeat tens of thousands of times and eventually you have a fully trained network for that kind of data.

You can think of all the possible combinations of connections as like the surface of a planet, with hills and valleys. (Ignore for the moment that the surface is just 3D and the actual topology is many-dimensional.) The optimization that the network goes through as it learns is just a process of finding the deepest valley on the planet. This consists of the following steps:

1. Define a "cost function" that determines how well the network solved the problem
2. Run the network once and see how it did at that cost function
3. Change the values of the connections and do it again. The difference between those two results is the direction, or "slope," in which the network moved between the two trials.
4. If the slope is pointed "downhill," change the connections more in that direction. If it's "uphill," change them in the opposite direction.
5. Repeat until there is no improvement in any direction. That means that you're in a minimum.

Congrats! But it's probably a *local* minimum, or a little dip in the mountains, so you're going to have to keep going if you want to do better. You can't keep going downhill, and you don't know where the absolute lowest point is, so you're going to have to somehow find it. There are many ways to do that, but here are a few:

1. Try lots of times with different random settings and share learning from each trial; essentially, you are shaking the system to see if it settles in a lower state. If one of the other trials found a lower valley, start with those settings.
2. Don't just go downhill but stumble around a bit like a drunk, too (this is called "stochastic gradient descent"). If you do this long enough, you'll eventually find rock bottom. There's a metaphor for life in that.
3. Just look for "interesting" features, which are defined by diversity (edges or color changes, for example). Warning: This way can lead to madness—too much "interestingness" draws the network to optical illusions. So keep it sane, and emphasize the kinds of features that are likely to be real in nature, as opposed to artifacts or errors. This is called "regularization," and there are lots of techniques for this, such as whether those kinds of features have been seen before (learned),

> or are too "high frequency" (like static) rather than "low frequency" (more continuous, like actual real-world features).

Just because AI systems sometimes end up in local minima, don't conclude that this makes them any less like life. Humans—indeed, probably all life-forms—are often stuck in local minima.

Take our understanding of the game of Go, which was taught and learned and optimized by humans for thousands of years. It took AIs less than three years to find out that we'd been playing it wrong all along and that there were better, almost alien, solutions to the game which we'd never considered—mostly because our brains don't have the processing power to consider so many moves ahead.

Even in chess, which is ten times easier and was thought to be understood, brute-force machines could beat us at our own strategies. Chess, too, turned out, when explored by superior neural-network AI systems, to have weird but superior strategies we'd never considered, like sacrificing queens early to gain an obscure long-term advantage. It's as if we had been playing 2D versions of games that actually existed in higher dimensions.

If any of this sounds familiar, it's because physics has been wrestling with these sorts of topological problems for decades. The notion of space being many-dimensional, and math reducing to understanding the geometries and interactions of "membranes" beyond the reach of our senses, is where Grand Unified Theorists go to die. But unlike multidimensional theoretical physics, AI is something we can actually experiment with and measure.

So that's what we're going to do. The next few decades will be an explosive exploration of ways to think that 7 million years of evolution never found. We're going to rock ourselves out of local minima and find deeper minima, maybe even global minima. And when we're done, we may even have taught machines to seem as smart as a mosquito, forever descending the cosmic gradients to an ultimate goal, whatever that may be.

David Kaiser *is a physicist atypically interested in the intersection of his science with politics and culture, about which he has written widely.*

In the first meeting (in Washington, Connecticut) that preceded the crafting of this book, he commented on the change in how "information" is viewed since Wiener's time: the military-industrial, Cold War era. Back then, Wiener compared information, metaphorically, to entropy, in that it could not be conserved—i.e., monopolized; thus, he argued, our atomic secrets and other such classified matters would not remain secrets for long. Today, whereas (as Wiener might have expected) information, fake or not, is leaking all over the other Washington, information in the economic world has indeed been stockpiled, commodified, and monetized.

This lockdown, David said, was "not all good, not all bad"—depending, I guess, on whether you're sick of being pestered by ads for socks or European river cruises popping up in your browser minutes after you've bought them.

To say nothing of information's proliferation. David complained to the rest of us attending the meeting that in Wiener's time, physicists could "take the entire Physical Review. *It would sit comfortably in front of us in a manageable pile. Now we're awash in fifty thousand open-source journals per minute," full of god-knows-what. Neither of these developments would Wiener have anticipated, said David, prompting him to ask, "Do we need a new set of guiding metaphors?"*

“INFORMATION” FOR WIENER, FOR SHANNON, AND FOR US

David Kaiser

***David Kaiser** is Germeshausen Professor of the History of Science and professor of physics at MIT, and head of its Program in Science, Technology & Society. He is the author of* How the Hippies Saved Physics: Science, Counterculture, and the Quantum Revival *and* American Physics and the Cold War Bubble *(forthcoming).*

In *The Sleepwalkers*, a sweeping history of scientific thought from ancient times through the Renaissance, Arthur Koestler identified a tension that has marked the most dramatic leaps of our cosmological imagination. In reading the great works of Nicolaus Copernicus and Johannes Kepler today, Koestler argued, we are struck as much by their strange unfamiliarity—their embeddedness in the magic or mysticism of an earlier age—as by their modern-sounding insights.

I detect that same doubleness—the zig-zag origami folds of old and new—in Norbert Wiener’s classic *The Human Use of Human Beings*. First published in 1950 and revised in 1954, the book is in many ways extraordinarily prescient. Wiener, the MIT polymath, recognized before most observers that “society can only be understood through a study of the messages and the communication facilities which belong to it.” Wiener argued that feedback loops, the central feature of his theory of cybernetics, would play a determining role in social dynamics. Those loops would not only connect people with one another but connect people with machines, and—crucially—machines with machines.

Wiener glimpsed a world in which information could be separated from its medium. People, or machines, could communicate patterns across vast distances and use them to fashion new items at the endpoints, without “moving a…particle of matter from one end of the line to the other,” a vision now realized in our world of networked 3D printers. Wiener also imagined machine-to-machine feedback loops driving huge advances in automation, even for tasks that had previously relied on human judgment. “The machine plays no favorites between manual labor and white-collar labor,” he observed.

For all that, many of the central arguments in *The Human Use of Human Beings* seem closer to the 19th century than the 21st. In particular, although Wiener made reference throughout to Claude Shannon’s then-new work on information theory, he seems not to have fully embraced Shannon’s notion of information as consisting of irreducible, meaning-free bits. Since Wiener’s day, Shannon’s theory has come to undergird recent advances in “Big Data” and “deep learning,” which makes it all the more interesting to revisit Wiener’s cybernetic imagination. How might tomorrow’s artificial intelligence be different if practitioners were to re-invest in Wiener’s guiding vision of “information”?

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When Wiener wrote *The Human Use of Human Beings*, his experiences of war-related research, and of what struck him as the moral ambiguities of intellectual life amid the military-industrial complex, were still fresh. Just a few years earlier, he had announced in the pages of *The Atlantic Monthly* that he would not "publish any future work of mine which may do damage in the hands of irresponsible militarists."[30] He remained ambivalent about the transformative power of new technologies, indulging in neither the boundless hype nor the digital utopianism of later pundits.

"Progress imposes not only new possibilities for the future but new restrictions," he wrote, in *Human Use*. He was concerned about human-made restrictions as well as technological ones, especially Cold War restrictions that threatened the flow of information so critical to cybernetic systems: "Under the impetus of Senator [Joseph] McCarthy and his imitators, the blind and excessive classification of military information" was driving political leaders in the United States to adopt a "secretive frame of mind paralleled in history only in the Venice of the Renaissance." Wiener, echoing many outspoken veterans of the Manhattan Project, argued that the postwar obsession with secrecy—especially around nuclear weapons—stemmed from a misunderstanding of the scientific process. The only genuine secret about the production of nuclear weapons, he wrote, was whether such bombs could be built. Once that secret had been revealed, with the bombings of Hiroshima and Nagasaki, no amount of state-imposed secrecy would stop others from puzzling through chains of reasoning like those the Manhattan Project researchers had followed. As Wiener memorably put it, "There is no Maginot Line of the brain."

To drive this point home, Wiener borrowed Shannon's fresh ideas about information theory. In 1948, Shannon, a mathematician and engineer working at Bell Labs, had published a pair of lengthy articles in the *Bell System Technical Journal*. Introducing the new work to a broad readership in 1949, mathematician Warren Weaver explained that in Shannon's formulation, "the word *information*…is used in a special sense that must not be confused with its ordinary usage. In particular, *information* must not be confused with meaning."[31] Linguists and poets might be concerned about the "semantic" aspects of communication, Weaver continued, but not engineers like Shannon. Rather, "this word 'information' in communication theory relates not so much to what you *do* say, as to what you *could* say." In Shannon's now-famous formulation, the information content of a string of symbols was given by the logarithm of the number of possible symbols from which a given string was chosen. Shannon's key insight was that the information of a message was just like the entropy of a gas: a measure of the system's disorder.

Wiener borrowed this insight when composing *Human Use*. If information was like entropy, then it could not be conserved—or contained. Physicists in the 19th century had demonstrated that the total energy of a physical system must always remain the same, a perfect balance between the start and the end of a process. Not so for entropy, which would inexorably increase over time, an imperative that came to be known as the second law of thermodynamics. From that stark distinction—energy is conserved, whereas entropy must grow—followed enormous cosmic consequences. Time must flow forward;

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[30] Norbert Wiener, "A Scientist Rebels," *The Atlantic Monthly,* January 1947.

[31] Warren Weaver, "Recent Contributions to the Mathematical Theory of Communication," in Claude Shannon & Warren Weaver, *The Mathematical Theory of Communication* (Urbana, IL: University of Illinois Press, 1949), p. 8 (emphasis in original). Shannon's 1948 papers were republished in the same volume.

the future cannot be the same as the past. The universe could even be careening toward a "heat death," some far-off time when the total stock of energy had uniformly dispersed, achieving a state of maximum entropy, after which no further change could occur.

If information *qua* entropy could not be conserved, then Wiener concluded it was folly for military leaders to try to stockpile the "scientific know-how of the nation in static libraries and laboratories." Indeed, "no amount of scientific research, carefully recorded in books and papers, and then put into our libraries with labels of secrecy, will be adequate to protect us for any length of time in a world where the effective level of information is perpetually advancing." Any such efforts at secrecy, classification, or the containment of information would fail, Wiener argued, just as surely as hucksters' schemes for perpetual-motion machines faltered in the face of the second law of thermodynamics.

Wiener criticized the American "orthodoxy" of free-market fundamentalism in much the same way. For most Americans, "questions of information will be evaluated according to a standard American criterion: a thing is valuable as a commodity for what it will bring in the open market." Indeed, "the fate of information in the typically American world is to become something which can be bought or sold;" most people, he observed, "cannot conceive of a piece of information without an owner." Wiener considered this view to be as wrong-headed as rampant military classification. Again he invoked Shannon's insight: Since "information and entropy are not conserved," they are "equally unsuited to being commodities."

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Information cannot be conserved—so far, so good. But did Wiener really have Shannon's "information" in mind? The crux of Shannon's argument, as Weaver had emphasized, was to distinguish a colloquial sense of "information," as message with meaning, from an abstracted, rarefied notion of strings of symbols arrayed with some probability and selected from an enormous universe of gibberish. For Shannon, "information" could be quantified because its fundamental unit, the bit, was a unit of conveyance rather than understanding.

When Wiener characterized "information" throughout *Human Use*, on the other hand, he tilted time and again to a classical, humanistic sense of the term. "A piece of information," he wrote—tellingly, not a "bit" of information—"in order to contribute to the general information of the community, must say something substantially different from the community's previous common stock of information." This was why "schoolboys do not like Shakespeare," he concluded: The Bard's couplets may depart starkly from random bitstreams, but they had nonetheless become all too familiar to the sense-making public and "absorbed into the superficial clichés of the time."

At least the information content of Shakespeare had once seemed fresh. During the postwar boom years, Wiener fretted, the "enormous per capita bulk of communication"—ranging across newspapers and movies to radio, television, and books—had bred mediocrity, an informational reversion to the mean. "More and more we must accept a standardized inoffensive and insignificant product which, like the white bread of the bakeries, is made rather for its keeping and selling properties than for its food value." "Heaven save us," he pleaded, "from the first novels which are written because a young man desires the prestige of being a novelist rather than because he has something to say! Heaven save us likewise from the mathematical papers which are correct and elegant but without body or spirit." Wiener's treatment of "information" sounded more like Matthew Arnold in 1869[32] than Claude Shannon in 1948—more "body and spirit" than "bit." Wiener shared Arnold's Romantic view of the "content producer" as well. "Properly speaking the artist, the writer, and the scientist should be moved by such an irresistible impulse to create that, even if they were not being paid for their work, they would be willing to pay to get the chance to do it." *L'art pour l'art*, that 19th-century cry: Artists should suffer for their work; the quest for meaningful expression should always trump lucre.

To Wiener, this was the proper measure of "information": body, spirit, aspiration, expression. Yet to argue against its commodification, Wiener reverted again to Shannon's mathematics of information-as-entropy.

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Flash forward to our day. In many ways, Wiener has been proved right. His vision of networked feedback loops driven by machine-to-machine communication has become a mundane feature of everyday life. From the earliest stirrings of the Internet Age, moreover, digital piracy has upended the view that "information"—in the form of songs, movies, books, or code—could remain contained. Put up a paywall here, and the content will diffuse over there, all so much informational entropy that cannot be conserved.

On the other hand, enormous multinational corporations—some of the largest and most profitable in the world—now routinely disprove Wiener's contention that "information" cannot be stockpiled or monetized. Ironically, the "information" they trade in is closer to Shannon's definition than Wiener's, Shannon's mathematical proofs notwithstanding.

While Google Books may help circulate hundreds of thousands of works of literature for free, Google itself—like Facebook, Amazon, Twitter, and their many imitators—has commandeered a baser form of "information" and exploited it for extraordinary profit. Petabytes of Shannon-like information—a seemingly meaningless stream of clicks, "likes," and retweets, collected from virtually every person who has ever touched a networked computer—are sifted through proprietary "deep-learning" algorithms to micro-target everything from the advertisements we see to the news stories (fake or otherwise) we encounter while browsing the Web.

Back in the early 1950s, Wiener had proposed that researchers study the structures and limitations of ants—in contrast to humans—so that machines might one day achieve the "almost indefinite intellectual expansion" that people (rather than insects) can attain. He found solace in the notion that machines could come to dominate us only "in the last stages of increasing entropy," when "the statistical differences among individuals are nil." Today's data-mining algorithms turn Wiener's approach on its head. They produce profit by exploiting our reptilian brains rather than imitating our cerebral cortexes, harvesting information from all our late-night, blog-addled, pleasure-seeking clickstreams—leveraging precisely the tiny, residual "statistical differences among individuals."

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[32] Matthew Arnold, *Culture and Anarchy,* Jane Garnett, ed. (Oxford, U.K.: Oxford University Press, 2006).

To be sure, some recent achievements in artificial intelligence have been remarkably impressive. Computers can now produce visual artworks and musical compositions akin to those of recognized masters, creating just the sort of "information" that Wiener most prized. But by far the largest impact on society to date has come from the collection and manipulation of Shannon-like information, which has reshaped our shopping habits, political participation, personal relationships, expectations of privacy, and more.

What might "deep learning" evolve into, if the fundamental currency becomes "information" as Wiener defined it? How might the field shift if re-animated by Wiener's deep moral convictions, informed as they were by his prescient concerns about rampant militarism, runaway corporate profit-seeking, the self-limiting features of secrecy, and the reduction of human expression to interchangeable commodities? Perhaps "deep learning" might then become the cultivation of meaningful information rather than the relentless pursuit of potent, if meaningless, bits.

In the aforementioned Connecticut discussion on The Human Use of Human Beings, **Neil Gershenfeld** *provided some fresh air, of a kind, by professing that he hated the book, which remark was met by universal laughter—as was his observation that computer science was one the worst things to happen to computers, or science. His overall contention was that Wiener missed the implications of the digital revolution that was happening around him—although some would say this charge can't be leveled at someone on the ground floor and lacking clairvoyance.*

"The tail wagging the dog of my life," he told us, "has been Fab Labs and the maker movement, and [when] Wiener talks about the threat of automation he misses the inverse, which is that access to the means for automation can empower people, and in Fab Labs, the corner I've been involved in, that's an exponential."

In 2003, I visited Neil at MIT, where he runs the Center for Bits and Atoms. Hours later, I emerged from what had been an exuberant display of very weird stuff. He showed me the work of one student in his popular rapid-prototyping class ("How to Make Almost Anything"), a sculptor with no engineering background, who had made a portable personal space for screaming that saves up your screams and plays them back later. Another student in the class had made a Web browser that lets parrots navigate the Net. Neil himself was doing fundamental research on the roadmap to that sci-fi staple, a "universal replicator." It was a visit that took me a couple of years to get my head around.

Neil manages a global network of Fab Labs—small-scale manufacturing systems, enabled by digital technologies, which give people the wherewithal to build whatever they'd like. As guru of the maker movement, which merges digital communication and computation with fabrication, he sometimes feels outside the current heated debate on AI safety. "My ability to do research rests on tools that augment my capabilities," he says. "Asking whether or not they are intelligent is as fruitful as asking how I know I exist—amusing philosophically, but not testable empirically." What interests him is "how bits and atoms relate—the boundary between digital and physical. Scientifically, it's the most exciting thing I know."

SCALING
Neil Gershenfeld

***Neil Gershenfeld** is a physicist and director of MIT's Center for Bits and Atoms. He is the author of* FAB, *co-author (with Alan Gershenfeld & Joel Cutcher-Gershenfeld) of* Designing Reality, *and founder of the global fab lab network.*

Discussions about artificial intelligence have been oddly ahistorical. They could better be described as manic-depressive; depending on how you count, we're now in the fifth boom-bust cycle. Those swings mask the continuity in the underlying progress and the implications for where it's headed.

The cycles have come in roughly decade-long waves. First there were mainframes, which by their very existence were going to automate away work. That ran into the reality that it was hard to write programs to do tasks that were simple for people to do. Then came expert systems, which were going to codify and then replace the knowledge of experts. These ran into difficulty in assembling that knowledge and reasoning about cases not already covered. Perceptrons sought to get around these problems by modeling how the brain learns, but they were unable to do much of anything. Multilayer perceptrons could handle test problems that had tripped up those simpler networks, but their demonstrations did poorly on unstructured, real-world problems. We're now in the deep-learning era, which is delivering on many of the early AI promises but in a way that's considered hard to understand, with consequences ranging from intellectual to existential threats.

Each of these stages was heralded as a revolutionary advance over the limitations of its predecessors, yet all effectively do the same thing: They make inferences from observations. How these approaches relate can be understood by how they scale—that is, how their performance depends on the difficulty of the problem they're addressing. Both a light switch and a self-driving car must determine their operator's intentions, but the former has just two options to choose from, whereas the latter has many more. The AI-boom phases have started with promising examples in limited domains; the bust phases came with the failure of those demonstrations to handle the complexity of less-structured, practical problems.

Less apparent is the steady progress we've made in mastering scaling. This progress rests on the technological distinction between linear and exponential functions—a distinction that was becoming evident at the dawn of AI but with implications for AI that weren't appreciated until many years later.

In one of the founding documents of the study of intelligent machines, *The Human Use of Human Beings*, Norbert Wiener does a remarkable job of identifying many of the most significant trends to arise since he wrote it, along with noting the people responsible for them and then consistently failing to recognize why these people's work proved to be so important. Wiener is credited with creating the field of cybernetics; I've never understood what that is, but what's missing from the book is at the heart of how AI has progressed. This history matters because of the echoes of it that persist to this day.

Claude Shannon makes a cameo appearance in the book, in the context of his thoughts about the prospects for a chess-playing computer. Shannon was doing something much more significant than speculating at the time: He was laying the foundations for the digital revolution. As a graduate student at MIT, he worked for Vannevar Bush on the Differential Analyzer. This was one of the last great analog computers, a room full of gears and shafts. Shannon's frustration with the difficulty of solving problems this way led him in 1937 to write what might be the best master's thesis ever. In it, he showed how electrical circuits could be designed to evaluate arbitrary logical expressions, introducing the basis for universal digital logic.

After MIT, Shannon studied communications at Bell Labs. Analog telephone calls degraded with distance; the farther they traveled, the worse they sounded. Rather than continue to improve them incrementally, Shannon showed in 1948 that by communicating with symbols rather than continuous quantities, the behavior is very different. Converting speech waveforms to the binary values of 1 and 0 is an example, but many other sets of symbols can be (and are) used in digital communications. What matters is not the particular symbols but rather the ability to detect and correct errors. Shannon found that if the noise is above a threshold (which depends on the system design), then there are certain to be errors. But if the noise is below a threshold, then a linear increase in the physical resources representing the symbol results in an exponential decrease in the likelihood of making an error in correctly receiving the symbol. This relationship was the first of what we'd now call a threshold theorem.

Such scaling falls off so quickly that the probability of an error can be so small as to effectively never happen. Each symbol sent multiplies rather than adds to the certainty, so that the probability of a mistake can go from 0.1 to 0.01 to 0.001, and so forth. This exponential decrease in communication errors made possible an exponential increase in the capacity of communication networks. And that eventually solved the problem of where the knowledge in an AI system came from.

For many years, the fastest way to speed up a computation was to do nothing—just wait for computers to get faster. In the same way, there were years of AI projects that aimed to accumulate everyday knowledge by laboriously entering pieces of information. That didn't scale; it could progress only as fast as the number of people doing the entering. But when phone calls, newspaper stories, and mail messages all moved onto the Internet, everyone doing any of those things became a data generator. The result was an exponential rather than a linear rate of knowledge accumulation.

John von Neumann also has a cameo in *The Human Use of Human Beings*, for game theory. What Wiener missed here was von Neumann's seminal role in digitizing computation. Whereas analog communication degraded with distance, analog computing (like the Differential Analyzer) degraded with time, accumulating errors as it progressed. Von Neumann presented in 1952 a result corresponding to Shannon's for computation (they had met at the Institute for Advanced Study, in Princeton), showing that it was possible to compute reliably with an unreliable computing device by using symbols rather than continuous quantities. This was, again, a scaling argument, with a linear increase in the physical resources representing the symbol resulting in an exponential reduction in the error rate as long as the noise was below a threshold. That's what makes it possible to have a billion transistors in a computer chip, with the last one as useful as the first one. This relationship led to an exponential increase in computing performance, which solved a second problem in AI: how to process exponentially increasing amounts of data.

The third problem that scaling solved for AI was coming up with the rules for reasoning without having to hire a programmer for each problem. Wiener recognized the role of feedback in machine learning, but he missed the key role of representation. It's not possible to store all possible images in a self-driving car, or all possible sounds in a conversational computer; they have to be able to generalize from experience. The "deep" part of deep learning refers not to the (hoped-for) depth of insight but to the depth of the mathematical network layers used to make predictions. It turned out that a linear increase in network complexity led to an exponential increase in the expressive power of the network.

If you lose your keys in a room, you can search for them. If you're not sure which room they're in, you have to search all the rooms in a building. If you're not sure which building they're in, you have to search all the rooms in all the buildings in a city. If you're not sure which city they're in, you have to search all the rooms in all the buildings in all the cities. In AI, finding the keys corresponds to things like a car safely following the road, or a computer correctly interpreting a spoken command, and the rooms and buildings and cities correspond to all of the options that have to be considered. This is called the curse of dimensionality.

The solution to the curse of dimensionality came in using information about the problem to constrain the search. The search algorithms themselves are not new. But when applied to a deep-learning network, they adaptively build up representations of where to search. The price of this is that it's no longer possible to exactly solve for the best answer to a problem, but typically all that's needed is an answer that's good enough.

Taken together, it shouldn't be surprising that these scaling laws have allowed machines to become effectively as capable as the corresponding stages of biological complexity. Neural networks started out with a goal of modeling how the brain works. That goal was abandoned as they evolved into mathematical abstractions unrelated to how neurons actually function. But now there's a kind of convergence that can be thought of as forward- rather than reverse-engineering biology, as the results of deep learning echo brain layers and regions.

One of the most difficult research projects I've managed paired what we'd now call data scientists with AI pioneers. It was a miserable experience in moving goalposts. As the former progressed in solving long-standing problems posed by the latter, this was deemed to not count because it wasn't accompanied by corresponding leaps in understanding the solutions. What's the value of a chess-playing computer if you can't explain how it plays chess?

The answer of course is that it can play chess. There is interesting emerging research that is applying AI to AI—that is, training networks to explain how they operate. But both brains and computer chips are hard to understand by watching their inner workings; they're easily interpreted only by observing their external interfaces. We come to trust (or not) brains and computer chips alike based on experience that tests them rather than on explanations for how they work.

Many branches of engineering are making a transition from what's called imperative to declarative or generative design. This means that instead of explicitly designing a system with tools like CAD files, circuit schematics, and computer code, you describe what you want the system to do and then an automated search is done for designs that satisfy your goals and restrictions. This approach becomes necessary as design complexity exceeds what can be understood by a human designer. While that might sound like a risk, human understanding comes with its own limits; engineering design is littered with what appeared to be good insights that have had bad consequences. Declarative design rests on all the advances in AI, plus the improving fidelity of simulations to virtually test designs.

The mother of all design problems is the one that resulted in us. The way we're designed resides in one of the oldest and most conserved parts of the genome, called the Hox genes. These are genes that regulate genes, in what are called developmental programs. Nothing in your genome stores the design of your body; your genome stores, rather, a series of steps to follow that results in your body. This is an exact parallel to how search is done in AI. There are too many possible body plans to search over, and most modifications would be either inconsequential or fatal. The Hox genes are a representation of a productive place for evolutionary search. It's a kind of natural intelligence at the molecular level.

AI has a mind-body problem, in that it has no body. Most work on AI is done in the cloud, running on virtual machines in computer centers where data are funneled. Our own intelligence is the result of a search algorithm (evolution) that was able to change our physical form as well as our programming—those are inextricably linked. If the history of AI can be understood as the working of scaling laws rather than a succession of fashions, then its future can be seen in the same way. What's now being digitized, after communication and computation, is fabrication, bringing the programmability of bits to the world of atoms. By digitizing not just designs but the construction of materials, the same lessons that von Neumann and Shannon taught us apply to exponentially increasing fabricational complexity.

I've defined digital materials to be those constructed from a discrete set of parts reversibly joined with a discrete set of relative positions and orientations. These attributes allow the global geometry to be determined from local constraints, assembly errors to be detected and corrected, heterogeneous materials to be joined, and structures to be disassembled rather than disposed of when they're no longer needed. The amino acids that are the foundation of life and the Lego bricks that are the foundation of play share these properties.

What's interesting about amino acids is that they're not interesting. They have attributes that are typical but not unusual, such as attracting or repelling water. But just twenty types of them are enough to make you. In the same way, twenty or so types of digital-material part types—conducting, insulating, rigid, flexible, magnetic, etc.—are enough to assemble the range of functions that go into making modern technologies like robots and computers.

The connection between computation and fabrication was foreshadowed by the very pioneers whose work the edifice of computing is based on. Wiener hinted at this by linking material transportation with message transportation. John von Neumann is credited with modern computer architecture, something he actually wrote very little about; the final thing he studied, and wrote about beautifully and at length, was self-reproducing systems. As an abstraction of life, he modeled a machine that can communicate a computation that constructs itself. And the final thing Alan Turing, who is credited with the theoretical framework for computer science, studied was how the instructions in genes can give rise to physical forms. These questions address a topic absent from a typical computer-science education: the physical configuration of a computation.

Von Neumann and Turing posed their questions as theoretical studies, because it was beyond the technology of their day to realize them. But with the convergence of communication and computation with fabrication, these investigations are now becoming accessible experimentally. Making an assembler that can assemble itself from the parts that it's assembling is a focus of my lab, along with collaborations to develop synthetic cells.

The prospect of physically self-reproducing automata is potentially much scarier than fears of out-of-control AI, because it moves the intelligence out here to where we live. It could be a roadmap leading to Terminator's Skynet robotic overlords. But it's also a more hopeful prospect, because an ability to program atoms as well as bits enables designs to be shared globally while locally producing things like energy, food, and shelter—all of these are emerging as exciting early applications of digital fabrication. Wiener worried about the future of work, but he didn't question implicit assumptions about the nature of work which are challenged when consumption can be replaced by creation.

History suggests that neither utopian nor dystopian scenarios prevail; we generally end up muddling along somewhere in between. But history also suggests that we don't have to wait on history. Gordon Moore in 1965 was able to use five years of the doubling of the specifications of integrated circuits to project what turned out to be fifty years of exponential improvements in digital technologies. We've spent many of those years responding to, rather than anticipating, its implications. We have more data available now than Gordon Moore did to project fifty years of doubling the performance of digital fabrication. With the benefit of hindsight, it should be possible to avoid the excesses of digital computing and communications this time around, and, from the outset, address issues like access and literacy.

If the maker movement is the harbinger of a third digital revolution, the success of AI in meeting many of its own early goals can be seen as the crowning achievement of the first two digital revolutions. Although machine making and machine thinking might appear to be unrelated trends, they lie in each other's futures. The same scaling trends that have made AI possible suggest that the current mania is a phase that will pass, to be followed by something even more significant: the merging of artificial and natural intelligence.

It was an advance for atoms to form molecules, molecules to form organelles, organelles to form cells, cells to form organs, organs to form organisms, organisms to form families, families to form societies, and societies to form civilizations. This grand evolutionary loop can now be closed, with atoms arranging bits arranging atoms.

While **Danny Hillis** *was an undergraduate at MIT, he built a computer out of Tinkertoys. It has around 10,000 wooden parts, plays tic-tac-toe, and never loses; it's now in the Computer History Museum, in Mountain View, California.*

As a graduate student at the MIT Computer Science and Artificial Intelligence Laboratory in the early 1980s, Danny designed a massively parallel computer with 64,000 processors. He named it the Connection Machine and founded what may have been the first AI company—Thinking Machines Corporation—to produce and market it. This was despite a lunch he had with Richard Feynman, at which the celebrated physicist remarked, "That is positively the dopiest idea I ever heard." Maybe "despite" is the wrong word, since Feynman had a well-known predilection for playing with dopey ideas. In the event, he showed up on the day the company was incorporated and stayed on, for summer jobs and special assignments, to make invaluable contributions to its work.

Danny has since established a number of technology companies, of which the latest is Applied Invention, which partners with commercial enterprises to develop technological solutions to their most intractable problems. He holds hundreds of U.S. patents, covering parallel computers, touch interfaces, disk arrays, forgery prevention methods, and a slew of electronic and mechanical devices. His imagination is apparently boundless, and here he sketches some possible scenarios that will result from our pursuit of a better and better AI.

"Our thinking machines are more than metaphors," he says. "The question is not, 'Will they be powerful enough to hurt us?' (they will), or whether they will always act in our best interests (they won't), but whether over the long term they can help us find our way—where we come out on the Panacea/Apocalypse continuum."

THE FIRST MACHINE INTELLIGENCES
W. Daniel Hillis

***W. Daniel "Danny" Hillis** is an inventor, entrepreneur, and computer scientist, Judge Widney Professor of Engineering and Medicine at USC, and author of* The Pattern on the Stone: The Simple Ideas That Make Computers Work.

> I have spoken of machines, but not only of machines having brains of brass and thews of iron. When human atoms are knit into an organization in which they are used, not in their full right as responsible human beings, but as cogs and levers and rods, it matters little that their raw material is flesh and blood. *What is used as an element in a machine, is in fact an element in the machine.* Whether we entrust our decisions to machines of metal, or to those machines of flesh and blood which are bureaus and vast laboratories and armies and corporations, we shall never receive the right answers to our questions unless we ask the right questions…. The hour is very late, and the choice of good and evil knocks at our door.
>
> —Norbert Wiener, *The Human Use of Human Beings*

Norbert Wiener was ahead of his time in recognizing the potential danger of emergent intelligent machines. I believe he was even further ahead in recognizing that the first artificial intelligences had already begun to emerge. He was correct in identifying the corporations and bureaus that he called "machines of flesh and blood" as the first intelligent machines. He anticipated the dangers of creating artificial superintelligences with goals not necessarily aligned with our own.

What is now clear, whether or not it was apparent to Wiener, is that these organizational superintelligences are not just made of humans, they are hybrids of humans and the information technologies that allow them to coordinate. Even in Wiener's time, the "bureaus and vast laboratories and armies and corporations" could not operate without telephones, telegraphs, radios, and tabulating machines. Today they could not operate without networks of computers, databases, and decision support systems. These hybrid intelligences are technologically augmented networks of humans. These artificial intelligences have superhuman powers. They can know more than individual humans; they can sense more; they can make more complicated analyses and more complex plans. They can have vastly more resources and power than any single individual.

Although we do not always perceive it, hybrid superintelligences such as nation states and corporations have their own emergent goals. Although they are built by and for humans, they often act like independent intelligent entities, and their actions are not always aligned to the interests of the people who created them. The state is not always for the citizen, nor the company for the shareholder. Nor do not-for-profits, religious orders, or political parties always act in furtherance of their founding principles. Intuitively, we recognize that their actions are guided by internal goals, which is why we personify them, both legally and in our habits of thought. When talking about "what China wants," or "what General Motors is trying to do," we are not speaking in metaphors. These organizations act as intelligences that perceive, decide, and act. Like the goals of individual humans, the goals of organizations are complex and often self-contradictory, but they are true goals in the sense that they direct action. Those goals depend somewhat on the goals of the people within the organization, but they are not identical.

Any American knows how loose the tie is between the actions of the U.S. government and the diverse and often contradictory aims of its citizens. That is also true of corporations. For-profit corporations nominally serve multiple constituencies, including shareholders, senior executives, employees, and customers. These corporations differ in how they balance their loyalties and often behave in ways that serve none of their constituents. The "neurons" that carry their corporate thought are not just the human employees or the technologies that connect them; they are also coded into the policies, incentive structures, culture, and procedural habits of the corporation. The emergent corporate goals do not always reflect the values of the people who implement them. For instance, an oil company led and staffed by people who care about the environment may have incentive structures or policies that cause it to compromise environmental safety for the sake of corporate earnings. The components' good intentions are not a guarantee of the emergent system's good behavior.

Governments and corporations, both built partly of humans, are naturally motivated to at least appear to share the goals of the humans they depend upon. They could not function without the people, so they need to keep them cooperative. When such organizations appear to behave altruistically, this is often part of their motive. I once complimented the CEO of a large corporation on the contribution his company made toward a humanitarian relief effort. The CEO responded, without a trace of irony, "Yes. We have decided to do more things like that to make our brand more likeable." Individuals who compose a hybrid superintelligence may occasionally exert a "humanizing" influence—for example, an employee may break company policies to accommodate the needs of another human. The employee may act out of true human empathy, but we should not attribute any such empathy to the superintelligence itself. These hybrid machines have goals, and their citizens/customers/employees are some of the resources they use to accomplish them.

We are close to being able to build superintelligences out of pure information technology, without human components. This is what people normally refer to as "artificial intelligence," or AI. It is reasonable to ask what the attitudes of the hypothetical machine superintelligences will be toward humans. Will they, too, see humans as useful resources and a good relationship with us as worth preserving? Will they be constructed to have goals that are aligned with our own? Will a superintelligence even see these questions as important? What are the "right questions" that we should be asking? I believe that one of the most important is this: What relationship will various superintelligences have to one another?

It is interesting to consider how the hybrid superintelligences currently deal with conflicts among themselves. Today, much of the ultimate power rests in the nation states, which claim authority over a patch of ground. Whether they are optimized to act in the interests of their citizens or those of a despotic ruler, nation states assert priority over other intelligences' desires or goals within their geographic dominion. They claim a monopoly on the use of force and recognize only other nation states as peers. They are willing, if necessary, to demand great sacrifices of their citizens to enforce their authority, even to the point of sacrificing their citizens' lives.

This geographical division of authority made logical sense when most of the actors were humans who spent their lives within a single nation state, but now that the actors of importance include geographically distributed hybrid intelligences such as multinational corporations, that logic is less obvious. Today we live in a complex transitional period, when distributed superintelligences still largely rely on the nation states to settle the arguments arising among them. Often, those arguments are resolved differently in different jurisdictions. It is becoming more difficult even to assign individual humans to nation states: International travelers living and working outside their native country, refugees, and immigrants (documented and not) are still dealt with as awkward exceptions. Superintelligences built purely of information technology will prove even more awkward for the territorial system of authority, since there is no reason why they need to be tied to physical resources in a single country—or even to any particular physical resources at all. An artificial intelligence might well exist "in the cloud" rather than at any physical location.

I can imagine at least four scenarios for how machine superintelligences will relate to hybrid superintelligences.

In one obvious scenario, multiple machine intelligences will ultimately be controlled by, and allied with, individual nation states. In this state/AI scenario, one can envision American and Chinese super-AIs wrestling each other for resources on behalf of their state. In some sense, these AIs would be citizens of their nation state in the way that many commercial corporations often act as "corporate citizens" today. In this scenario, the host nation states would presumably give the machine superintelligences the resources they needed to work for the state's advantage. Or, to the degree that the superintelligences can influence their state governments, they will presumably do so to enhance their own power, for instance by garnering a larger share of the state's resources. Nation states' AIs might not want competing AIs to grow up within their jurisdiction. In this scenario, the superintelligences become an extension of the state, and vice versa.

The state/AI scenario seems plausible, but it is not our current course. Our most powerful and rapidly improving artificial intelligences are controlled by for-profit corporations. This is the corporate/AI scenario, in which the balance of power between nation states and corporations becomes inverted. Today, the most powerful and intelligent collections of machines are probably owned by Google, but companies like Amazon, Baidu, Microsoft, Facebook, Apple, and IBM may not be far behind. These companies all see a business imperative to build artificial intelligences of their own. It is easy to imagine a future in which corporations independently build their own machine intelligences, protected within firewalls preventing the machines from taking advantage of one another's knowledge. These machines will be designed to have goals aligned with those of the corporation. If this alignment is effective, nation states may continue to lag behind in developing their own artificial-intelligence capability and instead depend on their "corporate citizens" to do it for them. To the extent that corporations successfully control the goals, they will become more powerful and autonomous than nation states.

Another scenario, perhaps the one people fear the most, is that artificial intelligences will not be aligned with either humans or hybrid superintelligences but will act solely in their own interest. They might even merge into a single machine superintelligence, since there may be no technical requirement for machine intelligences to maintain distinct identities. The attitude of a self-interested super-AI toward hybrid superintelligences is likely to be competitive. Humans might be seen as minor annoyances, like ants at a picnic, but hybrid superintelligences—like corporations, organized religions, and nation states—could be existential threats. Like hybrid superintelligences, AIs might see humans mostly as useful tools to accomplish their goals, as pawns in their competition with the other superintelligences. Or we might simply be irrelevant. It is not impossible that a machine intelligence has already emerged and we simply do not recognize it as such. It may not wish to be noticed, or it may be so alien to us that we are incapable of perceiving it. This makes the self-interested AI scenario the most difficult to imagine. I believe the easy-to-imagine versions, like the humanoid intelligent robots of science fiction, are the least likely. Our most complex machines, like the Internet, have already grown beyond the detailed understanding of a single human, and their emergent behaviors may be well beyond our ken.

The final scenario is that machine intelligences will not be allied with one another but instead will work to further the goals of humanity as a whole. In this optimistic scenario, AI could help us restore the balance of power between the individual and the corporation, between the citizen and the state. It could help us solve the problems that have been created by hybrid superintelligences that subvert the goals of humans. In this scenario, AIs will empower us by giving us access to processing capacity and knowledge currently available only to corporations and states. In effect, they could become extensions of our own individual intelligences, in furtherance of our human goals. They could make our weak individual intelligences strong. This prospect is both exciting and plausible. It is plausible because we have some choice in what we build, and we have a history of using technology to expand and augment our human capacities. As airplanes have given us wings and engines have given us muscles to move mountains, so our network of computers may amplify and extend our minds. We may not fully understand or control our destiny, but we have a chance to bend it in the direction of our values. The future is not something that will happen to us; it is something that we will build.

Why Wiener Saw What Others Missed

> There is in electrical engineering a split which is known in Germany as the split between the technique of strong currents and the technique of weak currents, and which we know as the distinction between power and communication engineering. It is this split which separates the age just past from that in which we are now living.
>
> —Norbert Wiener, *Cybernetics, or Control and Communication in the Animal and the Machine*

Cybernetics is the study of the how the weak can control the strong. Consider the defining metaphor of the field: the helmsman guiding a ship with a tiller. The helmsman's goal is to control the heading of the ship, to keep it on the right course. The information, the message that is sent to the helmsman, comes from the compass or the stars, and the helmsman closes the feedback loop by sending the steering messages through the gentle force of his hand on the tiller. In this picture, we see the ship tossing in powerful wind and waves in the real world, controlled by the communication system of messages in the world of information.

Yet the distinction between "real" and "information" is mostly a difference in perspective. The signals that carry messages, like the light of the stars and pressure of the hand on the tiller, exist in a world of energy and forces, as does the helmsman. The weak forces that control the rudder are as real and physical as the strong forces that toss the ship. If we shift our cybernetics perspective from the ship to the helmsman, the pressures on the rudder become a strong force of muscles controlled by the weak signals in the mind of the helmsman. These messages in the helmsman's mind are amplified into a physical force strong enough to steer the ship. Or instead, we can zoom out and take a large cybernetics perspective. We might see the ship itself as part of a vast trade network, part of a feedback loop that regulates the price of commodities through the flow of goods. In this perspective, the tiny ship is merely a messenger. So, the distinction between the physical world and the information world is a way to describe the relationship between the weak and the strong.

Wiener chose to view the world from the vantage point and scale of the individual human. As a cyberneticist, he took the perspective of the weak protagonist embedded within a strong system, trying to make the best of limited powers. He incorporated this perspective in his very definition of information. "Information," he said, "is a name for the content of what is exchanged with the outer world as we adjust to it, and make our adjustment felt upon it." In his words, information is what we use to "live effectively within that environment."[33] For Wiener, information is a way for the weak to effectively cope with the strong. This viewpoint is also reflected in Gregory Bateson's definition of information as "a difference that makes a difference," by which he meant the small difference that makes a big difference.

The goal of cybernetics was to create a tiny model of the system using "weak currents" to amplify and control "strong currents" of the real world. The central insight was that a control problem could be solved by building an analogous system in the information space of messages and then amplifying solutions into the larger world of reality. Inherent in the motion of a control system is the concept of amplification, which makes the small big and the weak strong. Amplification allows the difference that makes a difference to make a difference.

In this way of looking at the world, a control system needed to be as complex as the system it controlled. Cyberneticist W. Ross Ashby proved that this was true in a precise mathematical sense, in what is now called Ashby's Law of Requisite Variety, or sometimes the First Law of Cybernetics. The law tells us that to control a system completely, the controller must be as complex as the controlled. Thus cyberneticists tended to see control systems as a kind of analog of the systems they governed, like the homunculus—the hypothetical little person inside the brain who controls the actual person.

This notion of analogous structure is sometimes confused with the notion of analog encoding of messages, but the two are logically distinct. Norbert Wiener was much impressed with Vannevar Bush's Digital Differential Analyzer, which could be reconfigured to match the structure of whatever problem it was given to solve but used digital signal encoding. Signals could be simplified to openly represent the relevant distinctions, allowing them to be more accurately communicated and stored. In digital signals, one needed only to preserve the difference in signals that made a difference. It is this distinction and signal coding that we commonly use to distinguish "analog" versus "digital." Digital signal encoding was entirely compatible with cybernetic thinking—in fact, enabling to it. What was constraining to cybernetics was the presumption of an analogy of structure between the controller and the controlled. By the 1930s, Kurt Gödel, Alonzo Church, and Alan Turing had all described universal systems of computation, in which the computation required no structural analogy to functions that were computed. These universal computers could also compute the functions of control.

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[33] *The Human Use of Human Beings* (Boston: Houghton Mifflin, 1954), p. 17-18.

The analogy of structure between the controller and the controlled was central to the cybernetic perspective. Just as digital coding collapses the space of possible messages into a simplified version that represents only the difference that makes a difference, so the control system collapses the state space of a controlled system into a simplified model that reflects only the goals of the controller. Ashby's Law does not imply that every controller must model every state of the system but only those states that matter for advancing the controller's goals. Thus, in cybernetics, the goal of the controller becomes the perspective from which the world is viewed.

Norbert Wiener adopted the perspective of the individual human relating to vast organizations and trying to "live effectively within that environment." He took the perspective of the weak trying to influence the strong. Perhaps this is why he was able to notice the emergent goals of the "machines of flesh and blood" and anticipate some of the human challenges posed by these new intelligences, hybrid machine intelligences with goals of their own.

Venki Ramakrishnan *is a Nobel Prize-winning biologist whose many scientific contributions include his work on the atomic structure of the ribosome—in effect, a huge molecular machine that reads our genes and makes proteins. His work would have been impossible without powerful computers. The Internet made his own work a lot easier and, he notes, acted as a leveler internationally: "When I grew up in India, if you wanted to get a book, it would show up six months or a year after it had already come out in the West. . . . Journals would arrive by surface mail a few months later. I didn't have to deal with it, because I left India when I was nineteen, but I know Indian scientists had to deal with it. Today they have access to information at the click of a button. More important, they have access to lectures. They can listen to Richard Feynman. That would have been a dream of mine when I was growing up. They can just watch Richard Feynman on the Web. That's a big leveling in the field." And yet. . . "Along with the benefits [of the Web], there is now a huge amount of noise. You have all of these people spouting pseudoscientific jargon and pushing their own ideas as if they were science."*

As president of the Royal Society, Venki worries, too, about the broader issue of trust: public trust in evidence-based scientific findings, but also trust among scientists, bolstered by rigorous checking of one another's conclusions—trust that is in danger of eroding because of the "black box" character of deep-learning computers. "This [erosion] is going to happen more and more, as data sets get bigger, as we have genome-wide studies, population studies, and all sorts of things," he says. "How do we, as a science community, grapple with this and communicate to the public a sense of what science is about, what is reliable in science, what is uncertain in science, and what is just plain wrong in science?"

WILL COMPUTERS BECOME OUR OVERLORDS?

Venki Ramakrishnan

***Venki Ramakrishnan** is a scientist at the Medical Research Council Laboratory of Molecular Biology, Cambridge University; recipient of the Nobel Prize in Chemistry (2009); current president of the Royal Society; and the author of* Gene Machine: The Race to Discover the Secrets of the Ribosome.

A former colleague of mine, Gérard Bricogne, used to joke that carbon-based intelligence was simply a catalyst for the evolution of silicon-based intelligence. For quite a long time, both Hollywood movies and scientific Jeremiahs have been predicting our eventual capitulation to our computer overlords. We all await the singularity, which always seems to be just over the horizon.

In a sense, computers have already taken over, facilitating virtually every aspect of our lives—from banking, travel, and utilities to the most intimate personal communication. I can see and talk to my grandson in New York *for free*. I remember when I first saw the 1968 movie *2001: A Space Odyssey*, the audience laughed at the absurdly cheap cost of a picturephone call from space: $1.70, at a time when a long-distance call within the U.S. was $3 per minute.

However, the convenience and power of computers is also something of a Faustian bargain, for it comes with a loss of control. Computers prevent us from doing things we want. Try getting on a flight if you arrive at the airport and the airline computer systems are down, as happened not so long ago to British Airways at Heathrow. The planes, pilots, and passengers were all there; even the air-traffic controls were working. But no flights for that airline were allowed to take off. Computers also make us do things we *don't* want—by generating mailing lists and print labels to send us all millions of pieces of unwanted mail, which we humans have to sort, deliver, and dispose of.

But you ain't seen nothing yet. In the past, we programmed computers using algorithms we understood at least in principle. So when machines did amazing things like beating world chess champion Garry Kasparov, we could say that the victorious programs were designed with algorithms based on our own understanding—using, in this instance, the experience and advice of top grandmasters. Machines were simply faster at doing brute-force calculations, had prodigious amounts of memory, and were not prone to errors. One article described Deep Blue's victory not as that of a computer, which was just a dumb machine, but as the victory of hundreds of programmers over Kasparov, a single individual.

That way of programming is changing dramatically. After a long hiatus, the power of machine learning has taken off. Much of the change came when programmers, rather than trying to anticipate and code for every possible contingency, allowed computers to train themselves on data, using deep neural networks based on models of how our own brains learn. They use probabilistic methods to "learn" from large quantities of data; computers can recognize patterns and come up with conclusions on their own. A particularly powerful method is called reinforcement learning, by which the computer learns, without prior input, which variables are important and how much to weight them to reach a certain goal. This method in some sense mimics how we learn as children. The results from these new approaches are amazing.

Such a deep-learning program was used to teach a computer to play Go, a game that only a few years ago was thought to be beyond the reach of AI because it was so hard to calculate how well you were doing. It seemed that top Go players relied a great deal on intuition and a feel for position, so proficiency was thought to require a particularly human kind of intelligence. But the AlphaGo program produced by DeepMind, after being trained on thousands of high-level Go games played by humans and then millions of games with itself, was able to beat the top human players in short order. Even more amazingly, the related AlphaGo Zero program, which learned from scratch by playing itself, was stronger than the version trained initially on human games! It was as though the humans had been preventing the computer from reaching its true potential. The same method has recently been generalized: Starting from scratch, within just twenty-four hours, an equivalent AlphaZero chess program was able to beat today's top "conventional" chess programs, which in turn have beaten the best humans.

Progress has not been restricted to games. Computers are significantly better at image and voice recognition and speech synthesis than they used to be. They can detect tumors in radiographs earlier than most humans. Medical diagnostics and personalized medicine will improve substantially. Transportation by self-driving cars will keep us all safer, on average. My grandson may never have to acquire a driver's license, because driving a car will be like riding a horse today—a hobby for the few. Dangerous activities, such as mining, and tedious repetitive work will be done by computers. Governments will offer better targeted, more personalized and efficient public services. AI could revolutionize education by analyzing an individual pupil's needs and enabling customized teaching, so that each student can advance at an optimal rate.

Along with these huge benefits, of course, will come alarming risks. With the vast amounts of personal data, computers will learn more about us than we may know about ourselves; the question of who owns data about us will be paramount. Moreover, data-based decisions will undoubtedly reflect social biases: Even an allegedly neutral intelligent system designed to predict loan risks, say, may conclude that mere membership in a particular minority group makes you more likely to default on a loan. While this is an obvious example that we could correct, the real danger is that we are not always aware of biases in the data and may simply perpetuate them.

Machine learning may also perpetuate our own biases. When Netflix or Amazon tries to tell you what you might want to watch or buy, this is an application of machine learning. Currently such suggestions are sometimes laughable, but with time and more data they will get increasingly accurate, reinforcing our prejudices and likes and dislikes. Will we miss out on the random encounter that might persuade us to change our views by exposing us to new and conflicting ideas? Social media, given its influence on elections, is a particularly striking illustration of how the divide between people on different sides of the political spectrum can be accentuated.

We may have already reached the stage where most governments are powerless to resist the combined clout of a few powerful multinational companies that control us and our digital future. The fight between dominant companies today is really a fight for control over our data. They will use their enormous influence to prevent regulation of data, because their interests lie in unfettered control of it. Moreover, they have the financial resources to hire the most talented workers in the field, enhancing their power even further. We have been giving away valuable data for the sake of freebies like Gmail and Facebook, but as the journalist and author John Lanchester has pointed out in the *London Review of Books*, if it is free, then you are the product. Their real customers are the ones who pay them for access to knowledge about us, so that they can persuade us to buy their products or otherwise influence us. One way around the monopolistic control of data is to split the ownership of data away from firms that use them. Individuals would instead own and control access to their personal data (a model that would encourage competition, since people would be free to move their data to a company that offered better services). Finally, abuse of data is not limited to corporations: In totalitarian states, or even nominally democratic ones, governments know things about their citizens that Orwell could not have imagined. The use they make of this information may not always be transparent or possible to counter.

The prospect of AI for military purposes is frightening. One can imagine intelligent systems being designed to act autonomously based on real-time data and able to act faster than the enemy, starting catastrophic wars. Such wars may not necessarily be conventional or even nuclear wars. Given how essential computer networks are to modern society, it is much more likely that AI wars will be fought in cyberspace. The consequences could be just as dire.

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Despite this loss of control, we continue to march inexorably into a world in which AI will be everywhere: Individuals won't be able to resist its convenience and power, and corporations and governments won't be able to resist its competitive advantages. But important questions arise about the future of work. Computers have been responsible for considerable losses in blue-collar jobs in the last few decades, but until recently many white-collar jobs—jobs that "only humans can do"—were thought to be safe. Suddenly that no longer appears to be true. Accountants, many legal and medical professionals, financial analysts and stockbrokers, travel agents—in fact, a large fraction of white-collar jobs—will disappear as a result of sophisticated machine-learning programs. We face a future in which factories churn out goods with very few employees and the movement of goods is largely automated, as are many services. What's left for humans to do?

In 1930—long before the advent of computers, let alone AI—John Maynard Keynes wrote, in an essay called "Economic Possibilities for our Grandchildren," that as a result of improvements in productivity, society could produce all its needs with a fifteen-hour work week. He also predicted, along with the growth of creative leisure, the end of money and wealth as a goal:

> We shall be able to afford to dare to assess the money-motive at its true value. The love of money as a possession—as distinguished from the love of money as a means to the enjoyments and realities of life—will be recognised for what it is, a somewhat disgusting morbidity, one of those semi-criminal, semi-pathological propensities which one hands over with a shudder to the specialists in mental disease.

Sadly, Keynes's predictions did not come true. Although productivity did indeed increase, the system—possibly inherent in a market economy—did not result in humans working much shorter hours. Rather, what happened is what the anthropologist and anarchist David Graeber describes as the growth of "bullshit jobs."[34] While jobs that produce essentials like food, shelter, and goods have been largely automated away, we have seen an enormous expansion of sectors like corporate law, academic and health administration (as opposed to actual teaching, research, and the practice of medicine), "human resources," and public relations, not to mention new industries like financial services and telemarketing and ancillary industries in the so-called gig economy which serve those who are too busy doing all that additional work.

How will societies cope with technology's increasingly rapid destruction of entire professions and throwing large numbers of people out of work? Some argue that this concern is based on a false premise, because new jobs spring up that didn't exist before, but as Graeber points out, these new jobs won't necessarily be rewarding or fulfilling. During the first industrial revolution, it took almost a century before most people were better off. That revolution was possible only because the government of the time ruthlessly favored property rights over labor, and most people (and all women) did not have the vote. In today's democratic societies, it is not clear that the population will tolerate such a dramatic upheaval of society based on the promise that "eventually" things will get better.

Even that rosy vision will depend on a radical shake-up of education and lifelong learning. The Industrial Revolution did trigger enormous social change of this kind, including a shift to universal education. But it will not happen unless we make it happen: This is essentially about power, agency, and control. What's next for, say, the forty-year-old taxi driver or truck driver in an era of autonomous vehicles?

One idea that has been touted is that of a universal basic income, which will allow citizens to pursue their interests, retrain for new occupations, and generally be free to live a decent life. However, market economies, which are predicated on growing consumer demand over all else, may not tolerate this innovation. There is also a feeling among many that meaningful work is essential to human dignity and fulfillment. So another possibility is that the enormous wealth generated by increased productivity due to automation could be redistributed to jobs requiring human labor and creativity in fields such as the arts, music, social work, and other worthwhile pursuits. Ultimately, which jobs are rewarding or productive and which are "bullshit" is a matter of judgment and may vary from society to society, as well as over time.

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So far, I've focused on AI's practical consequences. As a scientist, what bothers me is our potential loss of understanding. We are now accumulating data at an incredible rate. In my own lab, an experiment generates over a terabyte of data a day. These data are massaged, analyzed, and reduced until there is an interpretable result. But in all of this data analysis, we believe we know what's happening. We know what the programs are doing because we designed the algorithms at their heart. So when our computers generate a result, we feel that we intellectually grasp it.

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[34] https://strikemag.org/bullshit-jobs/

The new machine-learning programs are different. Having recognized patterns via deep neural networks, they come up with conclusions, and we have no idea exactly how. When they uncover relationships, we don't understand it in the same way as if we had deduced those relationships ourselves using an underlying theoretical framework. As data sets become larger, we won't be able to analyze them ourselves even with the help of computers; rather, we will rely entirely on computers to do the analysis for us. So if someone asks us how we know something, we will simply say it is because the machine analyzed the data and produced the conclusion.

One day a computer may well come up with an entirely new result—e.g., a mathematical theorem whose proof, or even whose statement, no human can understand. That is philosophically different from the way we have been doing science. Or at least thought we had; some might argue that we don't know how our own brains reach conclusions either, and that these new methods are a way of mimicking learning by the human brain. Nevertheless, I find this potential loss of understanding disturbing.

Despite the remarkable advances in computing, the hype about AGI—a general-intelligence machine that will think like a human and possibly develop consciousness—smacks of science fiction to me, partly because we don't understand the brain at that level of detail. Not only do we not understand what consciousness is, we don't even understand a relatively simple problem like how we remember a phone number. In just that one question, there are all sorts of things to consider. How do we know it is a number? How do we associate it with a person, a name, face, and other characteristics? Even such seemingly trivial questions involve everything from high-level cognition and memory to how a cell stores information and how neurons interact.

Moreover, that's just one task among many that the brain does effortlessly. Whereas machines will no doubt do ever more amazing things, they're unlikely to be a replacement for human thought and human creativity and vision. Eric Schmidt, former chairman of Google's parent company, said in a recent interview at the London Science Museum that even designing a robot that would clear the table, wash the dishes, and put them away was a huge challenge. The calculations involved in figuring out all the movements the body has to make to throw a ball accurately or do slalom skiing are prodigious. The brain can do all these and also do mathematics and music, and *invent* games like chess and Go, not just play them. We tend to underestimate the complexity and creativity of the human brain and how amazingly general it is.

If AI is to become more humanlike in its abilities, the machine-learning and neuroscience communities need to interact closely, something that is happening already. Some of today's greatest exponents of machine learning—such as Geoffrey Hinton, Zoubin Ghahramani, and Demis Hassabis—have backgrounds in cognitive neuroscience, and their success has been at least in part due to attempts to model brainlike behavior in their algorithms. At the same time, neurobiology has also flourished. All sorts of tools have been developed to watch which neurons are firing and genetically manipulate them and see what's happening in real time with inputs. Several countries have launched moon-shot neuroscience initiatives to see if we can crack the workings of the brain. Advances in AI and neuroscience seem to go hand in hand; each field can propel the other.

Many evolutionary scientists, and such philosophers as Daniel Dennett, have pointed out that the human brain is the result of billions of years of evolution.[35] Human intelligence is not the special characteristic we think it is, but just another survival mechanism not unlike our digestive or immune systems, both of which are also amazingly complex. Intelligence evolved because it allowed us to make sense of the world around us, to plan ahead, and thus cope with all sorts of unexpected things in order to survive. However, as Descartes stated, we humans define our very existence by our ability to think. So it is not surprising that, in an anthropomorphic way, our fears about AI reflect this belief that our intelligence is what makes us special.

But if we step back and look at life on Earth, we see that we are far from the most resilient species. If we're going to be taken over at some point, it will be by some of Earth's oldest life-forms, like bacteria, which can live anywhere from Antarctica to deep-sea thermal vents hotter than boiling water, or in acid environments that would melt you and me. So when people ask where we're headed, we need to put the question in a broader context. I don't know what sort of future AI will bring: whether AI will make humans subservient or obsolete or will be a useful and welcome enhancement of our abilities which will enrich our lives. But I am reasonably certain that computers will never be the overlords of bacteria.

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[35] See, for example, Dennett's *From Bacteria to Bach and Back: The Evolution of Minds* (New York: W. W. Norton, 2017).

Alex "Sandy" Pentland, *an exponent of what he has termed "social physics," is interested in building powerful human-AI ecologies. He is concerned at the same time about the potential dangers of decision-making systems in which the data in effect take over and human creativity is relegated to the background.*

The advent of Big Data, he believes, has given us the opportunity to reinvent our civilization: "We can now begin to actually look at the details of social interaction and how those play out, and we're no longer limited to averages like market indices or election results. This is an astounding change. The ability to see the details of the market, of political revolutions, and to be able to predict and control them is definitely a case of Promethean fire—it could be used for good or for ill. Big Data brings us to interesting times."

At our group meeting in Washington, Connecticut, he confessed that reading Norbert Wiener on the concept of feedback "felt like reading my own thoughts."

"After Wiener, people discovered or focused on the fact that there are genuinely chaotic systems that are just not predictable," he said, "but if you look at human socioeconomic systems, there is a large percentage of variance you can account for and predict. . . . Today there is data from all sorts of digital devices, and from all of our transactions. The fact that everything is datafied means you can measure things in real time in most aspects of human life—and increasingly in every aspect of human life. The fact that we have interesting computers and machine-learning techniques means that you can build predictive models of human systems in ways you could never do before."

THE HUMAN STRATEGY
Alex “Sandy” Pentland

Alex “Sandy” Pentland *is Toshiba Professor and professor of media arts and sciences, MIT; director of the Human Dynamics and Connection Science labs and the Media Lab Entrepreneurship Program, and the author of* Social Physics.

In the last half-century, the idea of AI and intelligent robots has dominated thinking about the relationship between humans and computers. In part, this is because it’s easy to tell the stories about AI and robots, and in part because of early successes (e.g., theorem provers that reproduced most of Whitehead and Russell’s *Principia Mathematica*) and massive military funding. The earlier and broader vision of cybernetics, which considered the artificial as part of larger systems of feedback and mutual influence, faded from public awareness.

However, in the intervening years the cybernetics vision has slowly grown and quietly taken over—to the point where it is “in the air.” State-of-the-art research in most engineering disciplines is now framed as feedback systems that are dynamic and driven by energy flows. Even AI is being recast as human/machine “advisor” systems, and the military is beginning large-scale funding in this area—something that should perhaps worry us more than drones and independent humanoid robots.

But as science and engineering have adopted a more cybernetics-like stance, it has become clear that even the vision of cybernetics is far too small. It was originally centered on the embeddedness of the individual actor but not on the emergent properties of a network of actors. This is unsurprising, because the mathematics of networks did not exist until recently, so a quantitative science of how networks behave was impossible. We now know that study of the individual does not produce understanding of the system except in certain simple cases. Recent progress in this area was foreshadowed by understanding that “chaos,” and later “complexity,” were the typical behavior of systems, but we can now go far beyond these statistical understandings.

We’re beginning to be able to analyze, predict, and even design the emergent behavior of complex heterogeneous networks. The cybernetics view of the connected individual actor can now be expanded to cover complex systems of connected individuals and machines, and the insights we obtain from this broader view are fundamentally different from those obtained from the cybernetics view. Thinking about the network is analogous to thinking about entire ecosystems. How would you guide ecosystems to grow in a good direction? What do you even mean by “a good direction”? Questions like this are beyond the boundary of traditional cybernetic thinking.

Perhaps the most stunning realization is that humans are already beginning to use AI and machine learning to guide entire ecosystems, including ecosystems of people, thus creating human-AI ecologies. Now that everything is becoming “datafied,” we can measure most aspects of human life and, increasingly, aspects of all life. This, together with new, powerful machine-learning techniques, means that we can build models of these ecologies in ways we couldn’t before. Well-known examples are weather- and traffic-prediction models, which are being extended to predict the global climate and plan city growth and renewal. AI-aided engineering of the ecologies is already here.

Development of human-AI ecosystems is perhaps inevitable for a social species such as ourselves. We became social early in our evolution, millions of years ago. We began exchanging information with one another to stay alive, to increase our fitness. We developed writing to share abstract and complex ideas, and most recently we've developed computers to enhance our communication abilities. Now we're developing AI and machine-learning models of ecosystems and sharing the predictions of those models to jointly shape our world through new laws and international agreements.

We live in an unprecedented historic moment, in which the availability of vast amounts of human behavioral data and advances in machine learning enable us to tackle complex social problems through algorithmic decision making. The opportunities for such a human-AI ecology to have positive social impact through fairer and more transparent decisions are obvious. But there are also risks of a "tyranny of algorithms," where unelected data experts are running the world. The choices we make now are perhaps even more momentous than those we faced in the 1950s, when AI and cybernetics were created. The issues look similar, but they're not. We have moved down the road, and now the scope is larger. It's not just AI robots versus individuals. It's AI guiding entire ecologies.

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How can we make a good human-artificial ecosystem, something that's not a machine society but a cyberculture in which we can all live as humans—a culture with a human feel to it? We don't want to think small—for example, to talk only of robots and self-driving cars. We want this to be a global ecology. Think Skynet-size. But how would you make Skynet something that's about the human fabric?

The first thing to ask is: What's the magic that makes the current AI work? Where is it wrong and where is it right?

The good magic is that it has something called the credit-assignment function. What that lets you do is take "stupid neurons"—little linear functions—and figure out, in a big network, which ones are doing the work and strengthen them. It's a way of taking a random bunch of switches all hooked together in a network and making them smart by giving them feedback about what works and what doesn't. This sounds simple, but there's some complicated math around it. That's the magic that makes current AI work.

The bad part of it is, because those little neurons are stupid, the things they learn don't generalize very well. If an AI sees something it hasn't seen before, or if the world changes a little bit, the AI is likely to make a horrible mistake. It has absolutely no sense of context. In some ways, it's as far from Norbert Wiener's original notion of cybernetics as you can get, because it isn't contextualized; it's a little idiot savant.

But imagine that you took away those limitations: Imagine that instead of using dumb neurons, you used neurons in which real-world knowledge was embedded. Maybe instead of linear neurons, you used neurons that were functions in physics, and then you tried to fit physics data. Or maybe you put in a lot of knowledge about humans and how they interact with one another—the statistics and characteristics of humans.

When you add this background knowledge and surround it with a good credit-assignment function, then you can take observational data and use the credit-assignment function to reinforce the functions that are producing good answers. The result is an AI that works extremely well and can generalize. For instance, in solving physical problems, it often takes only a couple of noisy data points to get something that's a beautiful description of a phenomenon, because you're putting in knowledge about how physics works. That's in huge contrast to normal AI, which requires millions of training examples and is very sensitive to noise. By adding the appropriate background knowledge, you get much more intelligence.

Similar to the physical-systems case, if we make neurons that know a lot about how humans learn from each other, then we can detect human fads and predict human behavior trends in surprisingly accurate and efficient ways. This "social physics" works because human behavior is determined as much by the patterns of our culture as by rational, individual thinking. These patterns can be described mathematically and employed to make accurate predictions.

This idea of a credit-assignment function reinforcing connections between neurons that are doing the best work is the core of current AI. If you make those little neurons smarter, the AI gets smarter. So, what would happen if we replaced the neurons with people? People have lots of capabilities. They know lots of things about the world; they can perceive things in a broadly competent, human way. What would happen if you had a network of people in which you could reinforce the connections that were helping and minimize the connections that weren't?

That begins to sound like a society, or a company. We all live in a human social network. We're reinforced for doing things that seem to help everybody and discouraged from doing things that are not appreciated. Culture is the result of this sort of human AI as applied to human problems; it is the process of building social structures by reinforcing the good connections and penalizing the bad. Once you've realized you can take this general AI framework and create a human AI, the question becomes, What's the right way to do that? Is it a safe idea? Is it completely crazy?

My students and I are looking at how people make decisions, on huge databases of financial decisions, business decisions, and many other sorts of decisions. What we've found is that humans often make decisions in a way that mimics AI credit-assignment algorithms and works to make the community smarter. A particularly interesting feature of this work is that it addresses a classic problem in evolution known as the group-selection problem. The core of this problem is: How can we select for culture in evolution, when it's the individuals that reproduce? What you need is something that selects for the best cultures and the best groups but also selects for the best individuals, because they're the units that transmit the genes.

When you frame the question this way and go through the mathematical literature, you discover that there's one generally best way to do this. It's called "distributed Thompson sampling," a mathematical algorithm used in choosing, out of a set of possible actions with unknown payoffs, the action that maximizes the expected reward in respect to the actions. The key is social sampling, a way of combining evidence, of exploring and exploiting at the same time. It has the unusual property of simultaneously being the best strategy both for the individual and for the group. If you use the group as the basis of selection, and then the group either gets wiped out or reinforced, you're also selecting for successful individuals. If you select for individuals, and each individual does what's good for him or her, then that's automatically the best thing for the group. It's an amazing alignment of interests and utilities, and it provides real insight into the question of how culture fits into natural selection.

Social sampling, very simply, is looking around you at the actions of people who are like you, finding what's popular, and then copying it if it seems like a good idea to you. Idea propagation has this popularity function driving it, but individual adoption also is about figuring out how the idea works for the individual—a reflective attitude. When you combine social sampling and personal judgment, you get superior decision making. That's amazing, because now we have a mathematical recipe for doing with humans what all those AI techniques are doing with dumb computer neurons. We have a way of putting people together to make better decisions, given more and more experience.

So, what happens in the real world? Why don't we do this all the time? Well, people are good at it, but there are ways it can run amok. One of these is through advertising, propaganda, or "fake news." There are many ways to get people to think something is popular when it's not, and this destroys the usefulness of social sampling. The way you can make groups of people smarter, the way you can make human AI, will work only if you can get feedback to them that's truthful. It must be grounded on whether each person's actions worked for them or not.

That's the key to AI mechanisms, too. What they do is analyze whether they performed correctly. If so, plus one; if not, minus one. We need that truthful feedback to make this human mechanism work well, and we need good ways of knowing about what other people are doing so that we can correctly assess popularity and the likelihood of this being a good choice.

The next step is to build this credit-assignment function, this feedback function, for people, so that we can make a good human-artificial ecosystem—a smart organization and a smart culture. In a way, we need to duplicate some of the early insights that resulted in, for instance, the U.S. census—trying to find basic facts that everybody can agree on and understand so that the transmission of knowledge and culture can happen in a way that's truthful and social sampling can function efficiently.

We can address the problem of building an accurate credit-assignment function in many different settings. In companies, for instance, it can be done with digital ID badges that reveal who's connected to whom, so that we can assess the pattern of connections in relation to the company's results on a daily or weekly basis. The credit-assignment function asks whether those connections helped solve problems, or helped invent new solutions, and reinforces the helpful connections. When you can get that feedback quantitatively—which is difficult, because most things aren't measured quantitatively—both the productivity and the innovation rate within the organization can be significantly improved. This is, for instance, the basis of Toyota's "continuous improvement" method.

A next step is to try to do the same thing but at scale, something I refer to as building a trust network for data. It can be thought of as a distributed system like the Internet, but with the ability to quantitatively measure and communicate the qualities of human society, in the same way that the U.S. census does a pretty good job of telling us about population and life expectancy. We are already deploying prototype examples of trust networks at scale in several countries, based on the data and measurement standards laid out in the U.N. Sustainable Development Goals.

On the horizon is a vision of how we can make humanity more intelligent by building a human AI. It's a vision composed of two threads. One is data that we can all trust—data that have been vetted by a broad community, data where the algorithms are known and monitored, much like the census data we all automatically rely on as at least approximately correct. The other is a fair, data-driven assessment of public norms, policy, and government, based on trusted data about current conditions. This second thread depends on availability of trusted data and so is just beginning to be developed. Trusted data and data-driven assessment of norms, policy, and government together create a credit-assignment function that improves societies' overall fitness and intelligence.

It is precisely at the point of creating greater societal intelligence where fake news, propaganda, and advertising all get in the way. Fortunately, trust networks give us a path forward to building a society more resistant to echo-chamber problems, these fads, these exercises in madness. We have begun to develop a new way of establishing social measurements, in aid of curing some of the ills we see in society today. We're using open data from all sources, encouraging a fair representation of the things people are choosing, in a curated mathematical framework that can stamp out the echoes and the attempts to manipulate us.

On Polarization and Inequality

Extreme polarization and segregation by income are almost everywhere in the world today and threaten to tear governments and civil society apart. Increasingly, the media are becoming adrenaline pushers driven by advertising clicks and failing to deliver balanced facts and reasoned discourse—and the degradation of media is causing people to lose their bearings. They don't know what to believe, and thus they can easily be manipulated. There is a real need to ground our various cultures in trustworthy, data-driven standards that we all agree on, and to be able to know what behaviors and policies work and which don't.

In converting to a digital society, we've lost touch with traditional notions of truth and justice. Justice used to be mostly informal and normative. We've now formalized it. At the same time, we've put it out of reach for most people. Our legal systems are failing us in a way they didn't before, precisely because they're now more formal, more digital, less embedded in society.

Ideas about justice are very different around the world. One of the core differentiators is this: Do you or your parents remember when the bad guys came with guns and took everything? If you do, your attitude about justice is different from that of the average reader of this essay. Do you come from the upper classes? Or were you somebody who saw the sewers from the inside? Your view of justice depends on your history.

A common test I have for U.S. citizens is this: Do you know anybody who owns a pickup truck? It's the number-one-selling vehicle in the United States, and if you don't know people like that, you're out of touch with more than 50 percent of Americans. Physical segregation drives conceptual segregation. Most of America thinks of justice and access and fairness in terms very different from those of the typical, say, Manhattanite.

If you look at patterns of mobility—where people go—in a typical city, you find that the people in the top quintile (white-collar working families) and bottom quintile (people who are sometimes on unemployment or welfare) almost never talk to each other. They don't go to the same places; they don't talk about the same things. They all live in the same city, nominally, but it's as if it were two completely different cities—and this is perhaps the most important cause of today's plague of polarization.

On Extreme Wealth

Some two hundred of the world's wealthiest people have pledged to give away more than 50 percent of their wealth either during their lifetimes or in their wills, creating a plurality of voices in the foundation space.[36] Bill Gates is probably the most familiar example. He's decided that if the government won't do it, he'll do it. You want mosquito nets? He'll do it. You want antivirals? He'll do it. We're getting different stakeholders to take action in the form of foundations dedicated to public good, and they have different versions of what they consider the public good. This diversity of goals has created a lot of what's wonderful about the world today. Actions from outside government by organizations like the Ford Foundation and the Sloan Foundation, who bet on things that nobody else would bet on, have changed the world for the better.

Sure, these billionaires are human, with human foibles, and all is not necessarily as it should be. On the other hand, the same situation obtained when the railways were first built. Some people made huge fortunes. A lot of people went bust. We, the average people, got railways out of it. That's good. Same thing with electric power; same thing with many new technologies. There's a churning process that throws somebody up and later casts them or their heirs down. Bubbles of extreme wealth were a feature of the late 1800s and early 1900s when steam engines and railways and electric lights were invented. The fortunes they created were all gone within two or three generations.

If the U.S. were like Europe, I would worry. What you find in Europe is that the same families have held on to wealth for hundreds of years, so they're entrenched not just in terms of wealth but of the political system and in other ways. But so far, the U.S. has avoided this kind of hereditary class system. Extreme wealth hasn't stuck, which is good. It shouldn't stick. If you win the lottery, you get your billion dollars, but your grandkids ought to work for a living.

On AI and Society

People are scared about AI. Perhaps they should be. But they need to realize that AI feeds on data. Without data, AI is nothing. You don't have to watch the AI; instead you should watch what it eats and what it does. The trust-network framework we've set up, with the help of nations in the E.U. and elsewhere, is one where we can have our algorithms, we can have our AI, but we get to see what went in and what went out, so that we can ask, Is this a discriminatory decision? Is this the sort of thing that we want as humans? Or is this something that's a little weird?

The most revealing analogy is that regulators, bureaucracies, and parts of the government are very much like AIs: They take in the rules that we call law and regulation, and they add government data, and they make decisions that affect our lives. The part that's bad about the current system is that we have very little oversight of these departments, regulators, and bureaucracies. The only control we have is the vote—the opportunity to elect somebody different. We need to make oversight of bureaucracies a lot more fine-grained. We need to record the data that went into every single decision and have the results analyzed by the various stakeholders—rather like elected legislatures were originally intended to do.

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[36] https://givingpledge.org/About.aspx.

If we have the data that go into and out of each decision, we can easily ask, Is this a fair algorithm? Is this AI doing things that we as humans believe are ethical? This human-in-the-loop approach is called "open algorithms;" you get to see what the AIs take as input and what they decide using that input. If you see those two things, you'll know whether they're doing the right thing or the wrong thing. It turns out that's not hard to do. If you control the data, then you control the AI.

One thing people often fail to mention is that all the worries about AI are the same as the worries about today's government. For most parts of the government—the justice system, et cetera—there's no reliable data about what they're doing and in what situation. How can you know whether the courts are fair or not if you don't know the inputs and the outputs? The same problem arises with AI systems and is addressable in the same way. We need trusted data to hold current government to account in terms of what they take in and what they put out, and AI should be no different.

Next-Generation AI

Current AI machine-learning algorithms are, at their core, dead simple stupid. They work, but they work by brute force, so they need hundreds of millions of samples. They work because you can approximate anything with lots of little simple pieces. That's a key insight of current AI research—that if you use reinforcement learning for credit-assignment feedback, you can get those little pieces to approximate whatever arbitrary function you want.

But using the wrong functions to make decisions means the AI's ability to make good decisions won't generalize. If we give the AI new, different inputs, it may make completely unreasonable decisions. Or if the situation changes, then you need to retrain it. There are amusing techniques to find the "null space" in these AI systems. These are inputs that the AI thinks are valid examples of what it was trained to recognize (e.g., faces, cats, etc.), but to a human they're crazy examples.

Current AI is doing descriptive statistics in a way that's not science and would be almost impossible to make into science. To build robust systems, we need to know the science behind data. The systems I view as next-generation AIs result from this science-based approach: If you're going to create an AI to deal with something physical, then you should build the laws of physics into it as your descriptive functions, in place of those stupid little neurons. For instance, we know that physics uses functions like polynomials, sine waves, and exponentials, so those should be your basis functions and not little linear neurons. By using those more appropriate basis functions, you need a lot less data, you can deal with a lot more noise, and you get much better results.

As in the physics example, if we want to build an AI to work with human behavior, then we need to build the statistical properties of human networks into machine-learning algorithms. When you replace the stupid neurons with ones that capture the basics of human behavior, then you can identify trends with very little data, and you can deal with huge levels of noise.

The fact that humans have a "commonsense" understanding that they bring to most problems suggests what I call the human strategy: Human society is a network just like the neural nets trained for deep learning, but the "neurons" in human society are a lot smarter. You and I have surprisingly general descriptive powers that we use for understanding a wide range of situations, and we can recognize which connections should be reinforced. That means we can shape our social networks to work much better and potentially beat all that machine-based AI at its own game.

"URGENT!" URGENT!" the cc'd copy of an email screamed, one of a dozen emails that greeted me as I turned on my phone at the baggage carousel at Malpensa Airport after the long flight from JFK. "The great American visionary thinker John Brockman arrives this morning at Grand Hotel Milan. You MUST, repeat MUST pay him a visit." It was signed HUO.

The prior evening, waiting in the lounge at JFK, I had had the bright idea to write my friend and longtime collaborator, the London-based, peripatetic art curator **Hans Ulrich Obrist (***known to all as HUO), and ask if there was anyone in Milan I should know.*

Once I was settled at the hotel, the phone began ringing and a procession of leading Italian artists, designers, and architects called to request a meeting, including Enzo Mari, the modernist artist and furniture designer; Alberto Garutti, whose aesthetic strategies have inspired a dialogue between contemporary art, spectator, and public space; and fashion designer Miuccia Prada, who "requests your presence for tea this afternoon at Prada headquarters." And thus, thanks to HUO, did the jet-lagged "great American visionary thinker" stumble and mumble his way through his first day in Milan, November 2011.

HUO is sui generis*: He lives a twenty-four-hour day, sleeping (I guess) whenever, and employing full-time assistants who work eight-hour shifts and are available to him 24/7. Over a recent two-year period, he visited art venues in either China or India for forty weekends each year—departing London Thursday evening, back at his desk on Monday. Last year, once again,* ArtReview *ranked him #1 on their annual "Power 100" list.*

Recently we collaborated on a panel during the "GUEST, GHOST, HOST: MACHINE!" Serpentine event that took place at London's new City Hall. We were joined by Venki Ramakrishnan, Jaan Tallinn, and Andrew Blake, research director of The Alan Turing Institute. The event was consistent with HUO's mission of bringing together art and science: "The curator is no longer understood simply as the person who fills a space with objects," he says, "but also as the person who brings different cultural spheres into contact, invents new display features, and makes junctions that allow unexpected encounters and results."

MAKING THE INVISIBLE VISIBLE: ART MEETS AI

Hans Ulrich Obrist

***Hans Ulrich Obrist** is artistic director of the Serpentine Gallery, London, and the author of* Ways of Curating *and* Lives of the Artists, Lives of the Architects.

In the Introduction to the second edition of his book *Understanding Media*, Marshall McLuhan noted the ability of art to “anticipate future social and technological developments.” Art is “an early alarm system,” pointing us to new developments in times ahead and allowing us “to prepare to cope with them. . . . Art as a radar environment takes on the function of indispensable perceptual training. . . .”

In 1964, when McLuhan’s book was first published, the artist Nam June Paik was just building his *Robot K-456* to experiment with the technologies that subsequently would start to influence society. He had worked with television earlier, challenging its usual passive consumption by the viewer, and later made art with global live-satellite broadcasts, using the new media less for entertainment than to point us to their poetic and intercultural capacities (which are still mostly unused today). The Paiks of our time, of course, are now working with the Internet, digital images, and artificial intelligence. Their works and thoughts, again, are an early alarm system for the developments ahead of us.

As a curator, my daily work is to bring together different works of art and connect different cultures. Since the early 1990s, I have also been organizing conversations and meetings with practitioners from different disciplines, in order to go beyond the general reluctance to pool knowledge. Since I was interested in hearing what artists have to say about artificial intelligence, I recently organized several conversations between artists and engineers.

The reason to look closely at AI is that two of the most important questions of today are “How capable will AI become?” and “What dangers may arise from it?” Its early applications already influence our everyday lives in ways that are more or less recognizable. There is an increasing impact on many aspects of our society, but whether this might be, in general, beneficial or malign is still uncertain.

Many contemporary artists are following these developments closely. They are articulating various doubts about the promises of AI and reminding us not to associate the term “artificial intelligence” solely with positive outcomes. To the current discussions of AI, the artists contribute their specific perspectives and notably their focus on questions of image making, creativity, and the use of programming as artistic tools.

The deep connections between science and art had already been noted by the late Heinz von Foerster, one of the architects of cybernetics, who worked with Norbert Wiener from the mid-1940s and in the 1960s founded the field of second-order cybernetics, in which the observer is understood as part of the system itself and not an external entity. I knew von Foerster well, and in one of our many conversations, he offered his views on the relation between art and science:

> I’ve always perceived art and science as complementary fields. One shouldn’t forget that a scientist is in some respects also an artist. He invents a new technique and he describes it. He uses language like a poet, or the author of a detective novel, and describes his findings. In my view, a scientist must work in

> an artistic way if he wants to communicate his research. He obviously wants to communicate and talk to others. A scientist invents new objects, and the question is how to describe them. In all of these aspects, science is not very different from art.

When I asked him how he defined cybernetics, von Foerster answered:

> The substance of what we have learned from cybernetics is to think in circles: *A* leads *B, B* to *C,* but *C* can return to *A*. Such kinds of arguments are not linear but circular. The significant contribution of cybernetics to our thinking is to accept circular arguments. This means that we have to look at circular processes and understand under which circumstances an equilibrium, and thus a stable structure, emerges.

Today, where AI algorithms are applied in daily tasks, one can ask how the human factor is included in these kinds of processes and what role creativity and art could play in relation to them. There are thus different levels to think about when exploring the relation between AI and art.

So, what do contemporary artists have to say about artificial intelligence?

Artificial Stupidity

Hito Steyerl, an artist who works with documentary and experimental film, considers two key aspects that we should keep in mind when reflecting on the implications of AI for society. First, the expectations for so-called artificial intelligence, she says, are often overrated, and the noun "intelligence" is misleading; to counter that, she uses the term "artificial stupidity." Second, she points out that programmers are now making invisible software algorithms visible through images, but to understand and interpret these images better, we should apply the expertise of artists.

Steyerl has worked with computer technology for many years, and her recent artworks have explored surveillance techniques, robots, and such computer games as in *How Not to Be Seen* (2013), on digital-image technologies, or *HellYeahWeFuckDie* (2017), about the training of robots in the still-difficult task of keeping balance. But to explain her notion of artificial stupidity, Steyerl refers to a more general phenomenon, like the now widespread use of Twitter bots, noting in our conversation:

> It was and still is a very popular tool in elections to deploy Twitter armies to sway public opinion and deflect popular hashtags and so on. This is an artificial intelligence of a very, very low grade. It's two or maybe three lines of script. It's nothing very sophisticated at all. Yet the social implications of this kind of artificial stupidity, as I call it, are already monumental in global politics.

As has been widely noted, this kind of technology was seen in the many automated Twitter posts before the 2016 U.S. presidential election and also shortly before the Brexit vote. If even low-grade AI technology like these bots are already influencing our politics, this raises another urgent question: "How powerful will far more advanced techniques be in the future?"

Visible / Invisible

The artist Paul Klee often talked about art as "making the invisible visible." In computer technology, most algorithms work invisibly, in the background; they remain inaccessible in the systems we use daily. But lately there has been an interesting comeback of visuality in machine learning. The ways that the deep-learning algorithms of AI are processing data have been made visible through applications like Google's DeepDream, in which the process of computerized pattern-recognition is visualized in real time. The application shows how the algorithm tries to match animal forms with any given input. There are many other AI visualization programs that, in their way, also "make the invisible visible." The difficulty in the general public perception of such images is, in Steyerl's view, that these visual patterns are viewed uncritically as realistic and objective representations of the machine process. She says of the aesthetics of such visualizations:

> For me, this proves that science has become a subgenre of art history. . . . We now have lots of abstract computer patterns that might look like a Paul Klee painting, or a Mark Rothko, or all sorts of other abstractions that we know from art history. The only difference, I think, is that in current scientific thought they're perceived as representations of reality, almost like documentary images, whereas in art history there's a very nuanced understanding of different kinds of abstraction.

What she seeks is a more profound understanding of computer-generated images and the different aesthetic forms they use. They are obviously not generated with the explicit goal of following a certain aesthetic tradition. The computer engineer Mike Tyka, in a conversation with Steyerl, explained the functions of these images:

> Deep-learning systems, especially the visual ones, are really inspired by the need to know what's going on in the black box. Their goal is to project these processes back into the real world.

Nevertheless, these images have aesthetic implications and values which have to be taken into account. One could say that while the programmers use these images to help us better understand the programs' algorithms, we need the knowledge of artists to better understand the aesthetic forms of AI. As Steyerl has pointed out, such visualizations are generally understood as "true" representations of processes, but we should pay attention to their respective aesthetics, and their implications, which have to be viewed in a critical and analytical way.

In 2017, the artist Trevor Paglen created a project to make these invisible AI algorithms visible. In *Sight Machine*, he filmed a live performance of the Kronos Quartet and processed the resulting images with various computer software programs used for face detection, object identification, and even for missile guidance. He projected the outcome of these algorithms, in real time, back to screens above the stage. By demonstrating how the various different programs interpreted the musicians' performance, Paglen showed that AI algorithms are always determined by sets of values and interests which they then manifest and reiterate, and thus must be critically questioned. The significant contrast between algorithms and music also raises the issue of relationships between technical and human perception.

Computers, as a Tool for Creativity, Can't Replace the Artist.

Rachel Rose, a video artist who thinks about the questions posed by AI, employs computer technology in the creation of her works. Her films give the viewer an experience of materiality through the moving image. She uses collaging and layering of the material to manipulate sound and image, and the editing process is perhaps the most important aspect of her work.

She also talks about the importance of decision making in her work. For her, the artistic process does not follow a rational pattern. In a converation we had, together with the engineer Kenric McDowell, at the Google Cultural Institute, she explained this by citing a story from theater director Peter Brook's 1968 book *The Empty Space*. When Brook designed the set for his production of *The Tempest* in the late 1960s, he started by making a Japanese garden, but then the design evolved, becoming a white box, a black box, a realistic set, and so on. And in the end, he returned to his original idea. Brook writes that he was shocked at having spent a month on his labors, only to end at the beginning. But this shows that the creative artistic process is a succession whose every step builds on the next and which eventually comes to an unpredictable conclusion. The process is not a logical or rational succession but has mostly to do with the artist's feelings in reaction to the preceding result. Rose said, of her own artistic decision making:

> It, to me, is distinctively different from machine learning, because at each decision there's this core feeling that comes from a human being, which has to do with empathy, which has to do with communication, which has to do with questions about our own mortality that only a human could ask.

This point underlines the fundamental difference between any human artistic production and so-called computer creativity. Rose sees AI more as a possible way to create better tools for humans:

> A place I can imagine machine learning working for an artist would be not in developing an independent subjectivity, like writing a poem or making an image, but actually in filling in gaps that are to do with labor, like the way that Photoshop works with different tools that you can use.

And though such tools may not seem spectacular, she says, "they might have a larger influence on art," because they provide artists with further possibilities in their creative work.

McDowell added that he, too, believes there are false expectations around AI. "I've observed," he said, "that there's a sort of magical quality to the idea of a computer that does all the things that we do." He continued: "There's almost this kind of demonic mirror that we look into, and we want it to write a novel, we want it to make a film—we want to give that away somehow." He is instead working on projects wherein humans collaborate with the machine. One of the current aims of AI research is to find new means of interaction between humans and software. And art, one could say, needs to play a key role in that enterprise, since it focuses on our subjectivity and on essential human aspects like empathy and mortality.

Cybernetics / Art

Suzanne Treister is an artist whose work from 2009 to 2011 serves as an example of what is happening at the intersection of our current technologies, the arts, and cybernetics. Treister has been a pioneer in digital art since the 1990s, inventing, for example, imaginary video games and painting screen shots from them. In her project *Hexen 2.0* she looked back at the famous Macy conferences on cybernetics that between 1946 and 1953 were organized in New York by engineers and social scientists to unite the sciences and to develop a universal theory of the workings of the mind.

In her project, she created thirty photo-text works about the conference attendees (which included Wiener and von Foerster), she invented tarot cards, and she made a video based on a photomontage of a "cybernetic séance." In the "séance," the conference participants are seen sitting at a round table, as in spiritualist séances, while certain of their statements on cybernetics are heard in an audio-collage—rational knowledge and superstition combined. She also noted that some of the participating scientists worked for the military; thus the application of cybernetics could be seen in an ambivalent way, even back then, as a tussle between pure knowledge and its use in state control.

If one looks at Treister's work about the Macy conference participants, one sees that no visual artist was included. A dialogue between artists and scientists would be fruitful in future discussions, and it is a bit astonishing that this wasn't realized at the time, given von Foerster's keen interest in art. He recounted in one of our conversations how his relation to the field dated back to his childhood:

> I grew up as a child in an artistic family. We often had visits from poets, philosophers, painters, and sculptors. Art was a part of my life. Later, I got into physics, as I was talented in this subject. But I always remained conscious of the importance of art for science. There wasn't a great difference for me. For me, both aspects of life have always been very much alike—and accessible, too. We should see them as one. An artist also has to reflect on his work. He has to think about his grammar and his language. A painter must know how to handle his colors. Just think of how intensively oil colors were researched during the Renaissance. They wanted to know how a certain pigment could be mixed with others to get a certain tone of red or blue. Chemists and painters collaborated very closely. I think the artificial division between science and art is wrong.

Though for von Foerster the relation between the art and science was always clear, for our own time this connection remains to be made. There are many reasons to multiply the links. The critical thinking of artists would be beneficial in respect to the dangers of AI, since they draw our attention to questions they consider essential from their perspective. With the advent of machine learning, new tools are available to artists for their work. And as the algorithms of AI are made visible through artificial images in new ways, artists' critical visual knowledge and expertise will be harnessed. Many of the key questions of AI are philosophical in nature and can be answered only from a holistic point of view. The way they play out among adventurous artists will be worth following.

Simulating Worlds

For the most part, the works of contemporary artists have been embodied ruminations on

AI's impact on existential questions of the self and our future interaction with nonhuman entities. Few, though, have taken the technologies and innovations of AI as the underlying materials of their work and sculpted them to their own vision. An exception is the artist Ian Cheng, who has gone as far as to construct entire worlds of artificial beings with varying degrees of sentience and intelligence. He refers to these worlds as Live Simulations. His *Emissaries* trilogy (2015-2017) is set in a fictional postapocalyptic world of flora and fauna, in which AI-driven animals and creatures explore the landscape and interact with each other. Cheng uses advanced graphics but has them programmed with a lot of glitches and imperfections, which imparts a futuristic and anachronistic atmosphere at the same time. Through his trilogy, which charts a history of consciousness, he asks the question "What is a simulation?"

While the majority of artistic works that utilize recent developments in AI specifically draw from the field of machine learning, Cheng's Live Simulations take a separate route. The protagonists and plot lines that are interlaced in each episodic simulation of *Emissaries* use the complex logic systems and rules of AI. What is profound about his continually evolving scenes is that complexity arises not through the desire/actions of any single actor or artificial godhead but instead through their constellation, collision, and constant evolution in symbiosis with one another. This gives rise to unexpected outcomes and unending, unknowable situations—you can never experience the exact same moment in successive viewings of his work.

Cheng had a discussion at the Serpentine Marathon "GUEST, GHOST, HOST: MACHINE!" with the programmer Richard Evans, who recently designed Versu, an AI-based platform for interactive storytelling games. Evans' work emphasizes the social interaction of the games' characters, who react in a spectrum of possible behaviors to the choices made by the human players. In their conversation, Evans said that a starting point for the project was that most earlier simulation video games, such as *The Sims*, did not sufficiently take into account the importance of social practices. Simulated protagonists in games would often act in ways that did not correspond well with real human behavior. Knowledge of social practices limits the possibilities of action but is necessary to understand the meaning of our actions—which is what interests Cheng for his own simulations. The more parameters of actions in certain circumstances are determined in a computer simulation, the more interesting it is for Cheng to experiment with individual and specific changes. He told Evans, "I gather that if we had AI with more ability to respond to social contexts, tweaking one thing, you would get something quite artistic and beautiful."

Cheng also sees the work of programmers and AI simulations as creating new and sophisticated tools for experimenting with the parameters of our daily social practices. In this way, the involvement of artists in AI will lead to new kinds of open experiments in Art. Such possibilities are—like increased AI capabilities in general—still in the future. Recognizing that this is an experimental technology in its infancy, very far from apocalyptic visions of a superintelligent AI takeover, Cheng fills his simulations with prosaic avatars such as strange microbial globules, dogs, and the undead.

Discussions like these, between artists and engineers, of course are not totally new. In the 1960s, the engineer Billy Klüver brought artists together with engineers in a series of events, and in 1967 he founded the Experiments in Art and Technology program with Robert Rauschenberg and others. In London, at around the same time, Barbara

Stevini and John Latham, of the Artist Placement Group, took things a step further by asserting that there should be artists in residence in every company and every government. Today, these inspiring historical models can be applied to the field of AI. As AI comes to inhabit more and more of our everyday lives, the creation of a space that is nondeterministic and non-utilitarian in its plurality of perspectives and diversity of understandings will undoubtedly be essential.

Alison Gopnik *is an international leader in the field of children's learning and development and was one of the founders of the field of "theory of mind." She has spoken of the child brain as a "powerful learning computer," perhaps from personal experience. Her own Philadelphia childhood was an exercise in intellectual development. "Other families took their kids to see* The Sound of Music *or* Carousel*; we saw Racine's* Phaedra *and Samuel Beckett's* Endgame," *she has recalled. "Our family read Henry Fielding's 18th-century novel* Joseph Andrews *out loud to each other around the fire on camping trips."*

Lately she has invoked Bayesian models of machine learning to explain the remarkable ability of preschoolers to draw conclusions about the world around them without benefit of enormous data sets. "I think babies and children are actually more conscious than we are as adults," she has said. "They're very good at taking in lots of information from lots of different sources at once." She has referred to babies and young children as "the research and development division of the human species." Not that she treats them coldly, as if they were mere laboratory animals. They appear to revel in her company, and in the blinking, thrumming toys in her Berkeley lab. For years after her own children had outgrown it, she kept a playpen in her office.

Her investigations into just how we learn, and the parallels to the deep-learning methods of AI, continues. "It turns out to be much easier to simulate the reasoning of a highly trained adult expert than to mimic the ordinary learning of every baby," she says. "Computation is still the best—indeed, the only—scientific explanation we have of how a physical object like a brain can act intelligently. But, at least for now, we have almost no idea at all how the sort of creativity we see in children is possible."

AIs VERSUS FOUR-YEAR-OLDS

Alison Gopnik

***Alison Gopnik** is a developmental psychologist at UC Berkeley; her books include* The Philosophical Baby *and, most recently,* The Gardener and the Carpenter: What the New Science of Child Development Tells Us About the Relationship Between Parents and Children.

Everyone's heard about the new advances in artificial intelligence, and especially machine learning. You've also heard utopian or apocalyptic predictions about what those advances mean. They have been taken to presage either immortality or the end of the world, and a lot has been written about both those possibilities. But the most sophisticated AIs are still far from being able to solve problems that human four-year-olds accomplish with ease. In spite of the impressive name, artificial intelligence largely consists of techniques to detect statistical patterns in large data sets. There is much more to human learning.

How can we possibly know so much about the world around us? We learn an enormous amount even when we are small children; four-year-olds already know about plants and animals and machines; desires, beliefs, and emotions; even dinosaurs and spaceships.

Science has extended our knowledge about the world to the unimaginably large and the infinitesimally small, to the edge of the universe and the beginning of time. And we use that knowledge to make new classifications and predictions, imagine new possibilities, and make new things happen in the world. But all that reaches any of us from the world is a stream of photons hitting our retinas and disturbances of air at our eardrums. How do we learn so much about the world when the evidence we have is so limited? And how do we do all this with the few pounds of grey goo that sits behind our eyes?

The best answer so far is that our brains perform computations on the concrete, particular, messy data arriving at our senses, and those computations yield accurate representations of the world. The representations seem to be structured, abstract, and hierarchical; they include the perception of three-dimensional objects, the grammars that underlie language, and mental capacities like "theory of mind," which lets us understand what other people think. Those representations allow us to make a wide range of new predictions and imagine many new possibilities in a distinctively creative human way.

This kind of learning isn't the only kind of intelligence, but it's a particularly important one for human beings. And it's the kind of intelligence that is a specialty of young children. Although children are dramatically bad at planning and decision making, they are the best learners in the universe. Much of the process of turning data into theories happens before we are five.

Since Aristotle and Plato, there have been two basic ways of addressing the problem of how we know what we know, and they are still the main approaches in machine learning. Aristotle approached the problem from the bottom up: Start with senses—the stream of photons and air vibrations (or the pixels or sound samples of a digital image or recording)—and see if you can extract patterns from them. This approach was carried further by such classic associationists as philosophers David Hume and J. S. Mill and later by behavioral psychologists, like Pavlov and B. F. Skinner. On this view, the abstractness and hierarchical structure of representations is something of an illusion, or at least an epiphenomenon. All the work can be done by association and pattern detection—especially if there are enough data.

Over time, there has been a seesaw between this bottom-up approach to the mystery of learning and Plato's alternative, top-down one. Maybe we get abstract knowledge from concrete data because we already know a lot, and especially because we already have an array of basic abstract concepts, thanks to evolution. Like scientists, we can use those concepts to formulate hypotheses about the world. Then, instead of trying to extract patterns from the raw data, we can make predictions about what the data should look like if those hypotheses are right. Along with Plato, such "rationalist" philosophers and psychologists as Descartes and Noam Chomsky took this approach.

Here's an everyday example that illustrates the difference between the two methods: solving the spam plague. The data consist of a long unsorted list of messages in your in-box. The reality is that some of these messages are genuine and some are spam. How can you use the data to discriminate between them?

Consider the bottom-up technique first. You notice that the spam messages tend to have particular features: a long list of addressees, origins in Nigeria, references to million-dollar prizes or Viagra. The trouble is that perfectly useful messages might have these features, too. If you looked at enough examples of spam and non-spam emails, you might see not only that spam emails tend to have those features but that the features tend to go together in particular ways (Nigeria plus a million dollars spells trouble). In fact, there might be some subtle higher-level correlations that discriminate the spam messages from the useful ones—a particular pattern of misspellings and IP addresses, say. If you detect those patterns, you can filter out the spam.

The bottom-up machine-learning techniques do just this. The learner gets millions of examples, each with some set of features and each labeled as spam (or some other category) or not. The computer can extract the pattern of features that distinguishes the two, even if it's quite subtle.

How about the top-down approach? I get an email from the editor of the *Journal of Clinical Biology*. It refers to one of my papers and says that they would like to publish an article by me. No Nigeria, no Viagra, no million dollars; the email doesn't have any of the features of spam. But by using what I already know, and thinking in an abstract way about the process that produces spam, I can figure out that this email is suspicious.

(1) I know that spammers try to extract money from people by appealing to human greed.

(2) I also know that legitimate "open access" journals have started covering their costs by charging authors instead of subscribers, and that I don't practice anything like clinical biology.

Put all that together and I can produce a good new hypothesis about where that email came from. It's designed to sucker academics into paying to "publish" an article in a fake journal. The email was a result of the same dubious process as the other spam emails, even though it looked nothing like them. I can draw this conclusion from just one example, and I can go on to test my hypothesis further, beyond anything in the email itself, by googling the "editor."

In computer terms, I started out with a "generative model" that includes abstract concepts like greed and deception and describes the process that produces email scams. That lets me recognize the classic Nigerian email spam, but it also lets me imagine many different kinds of possible spam. When I get the journal email, I can work backward: "This seems like just the kind of mail that would come out of a spam-generating process."

The new excitement about AI comes because AI researchers have recently produced powerful and effective versions of both these learning methods. But there is nothing profoundly new about the methods themselves.

Bottom-up Deep Learning

In the 1980s, computer scientists devised an ingenious way to get computers to detect patterns in data: connectionist, or neural-network, architecture (the "neural" part was, and still is, metaphorical). The approach fell into the doldrums in the '90s but has recently been revived with powerful "deep-learning" methods like Google's DeepMind.

For example, you can give a deep-learning program a bunch of Internet images labeled "cat," others labeled "house," and so on. The program can detect the patterns differentiating the two sets of images and use that information to label new images correctly. Some kinds of machine learning, called unsupervised learning, can detect patterns in data with no labels at all; they simply look for clusters of features—what scientists call a factor analysis. In the deep-learning machines, these processes are repeated at different levels. Some programs can even discover relevant features from the raw data of pixels or sounds; the computer might begin by detecting the patterns in the raw image that correspond to edges and lines and then find the patterns in those patterns that correspond to faces, and so on.

Another bottom-up technique with a long history is reinforcement learning. In the 1950s, B. F. Skinner, building on the work of John Watson, famously programmed pigeons to perform elaborate actions—even guiding air-launched missiles to their targets (a disturbing echo of recent AI) by giving them a particular schedule of rewards and punishments. The essential idea was that actions that were rewarded would be repeated and those that were punished would not, until the desired behavior was achieved. Even in Skinner's day, this simple process, repeated over and over, could lead to complex behavior. Computers are designed to perform simple operations over and over on a scale that dwarfs human imagination, and computational systems can learn remarkably complex skills in this way.

For example, researchers at Google's DeepMind used a combination of deep learning and reinforcement learning to teach a computer to play Atari video games. The computer knew nothing about how the games worked. It began by acting randomly and got information only about what the screen looked like at each moment and how well it had scored. Deep learning helped interpret the features on the screen, and reinforcement learning rewarded the system for higher scores. The computer got very good at playing several of the games, but it also completely bombed on others just as easy for humans to master.

A similar combination of deep learning and reinforcement learning has enabled the success of DeepMind's AlphaZero, a program that managed to beat human players at both chess and Go, equipped only with a basic knowledge of the rules of the game and some planning capacities. AlphaZero has another interesting feature: It works by playing hundreds of millions of games against itself. As it does so, it prunes mistakes that led to losses, and it repeats and elaborates on strategies that led to wins. Such systems, and others involving techniques called generative adversarial networks, generate data as well as observing data.

When you have the computational power to apply those techniques to very large data sets or millions of email messages, Instagram images, or voice recordings, you can solve problems that seemed very difficult before. That's the source of much of the excitement in computer science. But it's worth remembering that those problems—like recognizing that an image is a cat or a spoken word is "Siri"—are trivial for a human toddler. One of the most interesting discoveries of computer science is that problems that are easy for us (like identifying cats) are hard for computers—much harder than playing chess or Go. Computers need millions of examples to categorize objects that we can categorize with just a few. These bottom-up systems can generalize to new examples; they can label a new image as a "cat" fairly accurately, over all. But they do so in ways quite different from how humans generalize. Some images almost identical to a cat image won't be identified by us as cats at all. Others that look like a random blur will be.

Top-down Bayesian Models

The top-down approach played a big role in early AI, and in the 2000s it, too, experienced a revival, in the form of probabilistic, or Bayesian, generative models.

The early attempts to use this approach faced two kinds of problems. First, most patterns of evidence might in principle be explained by many different hypotheses: It's possible that my journal email message is genuine, it just doesn't seem likely. Second, where do the concepts that the generative models use come from in the first place? Plato and Chomsky said you were born with them. But how can we explain how we learn the latest concepts of science? Or how even young children understand about dinosaurs and rocket ships?

Bayesian models combine generative models and hypothesis testing with probability theory, and they address these two problems. A Bayesian model lets you calculate just how likely it is that a particular hypothesis is true, given the data. And by making small but systematic tweaks to the models we already have, and testing them against the data, we can sometimes make new concepts and models from old ones. But these advantages are offset by other problems. The Bayesian techniques can help you choose which of two hypotheses is more likely, but there are almost always an enormous number of possible hypotheses, and no system can efficiently consider them all. How do you decide which hypotheses are worth testing in the first place?

Brenden Lake at NYU and colleagues have used these kinds of top-down methods to solve another problem that's easy for people but extremely difficult for computers: recognizing unfamiliar handwritten characters. Look at a character on a Japanese scroll. Even if you've never seen it before, you can probably tell if it's similar to or different from a character on another Japanese scroll. You can probably draw it and even design a fake Japanese character based on the one you see—one that will look quite different from a Korean or Russian character.[37]

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[37] Brenden M. Lake, Ruslan Salakhutdinov & Joshua B. Tenenbaum, "Human-level concept learning through probabilistic program induction," *Science,* 350:6266, pp. 1332-38 (2015).

The bottom-up method for recognizing handwritten characters is to give the computer thousands of examples of each one and let it pull out the salient features. Instead, Lake *et al.* gave the program a general model of how you draw a character: A stroke goes either right or left; after you finish one, you start another; and so on. When the program saw a particular character, it could infer the sequence of strokes that were most likely to have led to it—just as I inferred that the spam process led to my dubious email. Then it could judge whether a new character was likely to result from that sequence or from a different one, and it could produce a similar set of strokes itself. The program worked much better than a deep-learning program applied to exactly the same data, and it closely mirrored the performance of human beings.

These two approaches to machine learning have complementary strengths and weaknesses. In the bottom-up approach, the program doesn't need much knowledge to begin with, but it needs a great deal of data, and it can generalize only in a limited way. In the top-down approach, the program can learn from just a few examples and make much broader and more varied generalizations, but you need to build much more into it to begin with. A number of investigators are currently trying to combine the two approaches, using deep learning to implement Bayesian inference.

The recent success of AI is partly the result of extensions of those old ideas. But it has more to do with the fact that, thanks to the Internet, we have much more data, and thanks to Moore's Law we have much more computational power to apply to that data. Moreover, an unappreciated fact is that the data we do have has already been sorted and processed by human beings. The cat pictures posted to the Web are canonical cat pictures—pictures that humans have already chosen as "good" pictures. Google Translate works because it takes advantage of millions of human translations and generalizes them to a new piece of text, rather than genuinely understanding the sentences themselves.

But the truly remarkable thing about human children is that they somehow combine the best features of each approach and then go way beyond them. Over the past fifteen years, developmentalists have been exploring the way children learn structure from data. Four-year-olds can learn by taking just one or two examples of data, as a top-down system does, and generalizing to very different concepts. But they can also learn new concepts and models from the data itself, as a bottom-up system does.

For example, in our lab we give young children a "blicket detector"—a new machine to figure out, one they've never seen before. It's a box that lights up and plays music when you put certain objects on it but not others. We give children just one or two examples of how the machine works, showing them that, say, two red blocks make it go, while a green-and-yellow combination doesn't. Even eighteen-month-olds immediately figure out the general principle that the two objects have to be the same to make it go, and they generalize that principle to new examples: For instance, they will choose two objects that have the same *shape* to make the machine work. In other experiments, we've shown that children can even figure out that some hidden invisible property makes the machine go, or that the machine works on some abstract logical principle.[38]

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[38] A. Gopnik, T. Griffiths & C. Lucas, "When younger learners can be better (or at least more open-minded) than older ones," *Curr. Dir. Psychol. Sci.,* 24:2, 87-92 (2015).

You can show this in children's everyday learning, too. Young children rapidly learn abstract intuitive theories of biology, physics, and psychology in much the way adult scientists do, even with relatively little data.

The remarkable machine-learning accomplishments of the recent AI systems, both bottom-up and top-down, take place in a narrow and well-defined space of hypotheses and concepts—a precise set of game pieces and moves, a predetermined set of images. In contrast, children and scientists alike sometimes change their concepts in radical ways, performing paradigm shifts rather than simply tweaking the concepts they already have.

Four-year-olds can immediately recognize cats and understand words, but they can also make creative and surprising new inferences that go far beyond their experience. My own grandson recently explained, for example, that if an adult wants to become a child again, he should try not eating any healthy vegetables, since healthy vegetables make a child grow into an adult. This kind of hypothesis, a plausible one that no grown-up would ever entertain, is characteristic of young children. In fact, my colleagues and I have shown systematically that preschoolers are better at coming up with unlikely hypotheses than older children and adults.[39] We have almost no idea how this kind of creative learning and innovation is possible.

Looking at what children do, though, may give programmers useful hints about directions for computer learning. Two features of children's learning are especially striking. Children are active learners; they don't just passively soak up data like AIs do. Just as scientists experiment, children are intrinsically motivated to extract information from the world around them through their endless play and exploration. Recent studies show that this exploration is more systematic than it looks and is well-adapted to find persuasive evidence to support hypothesis formation and theory choice.[40] Building curiosity into machines and allowing them to actively interact with the world might be a route to more realistic and wide-ranging learning.

Second, children, unlike existing AIs, are social and cultural learners. Humans don't learn in isolation but avail themselves of the accumulated wisdom of past generations. Recent studies show that even preschoolers learn through imitation and by listening to the testimony of others. But they don't simply passively obey their teachers. Instead they take in information from others in a remarkably subtle and sensitive way, making complex inferences about where the information comes from and how trustworthy it is and systematically integrating their own experiences with what they are hearing.[41]

"Artificial intelligence" and "machine learning" sound scary. And in some ways they are. These systems are being used to control weapons, for example, and we really should be scared about that. Still, natural stupidity can wreak far more havoc than artificial intelligence; we humans will need to be much smarter than we have been in the past to properly regulate the new technologies. But there is not much basis for either the apocalyptic or the utopian visions of AIs replacing humans. Until we solve the basic paradox of learning, the best artificial intelligences will be unable to compete with the average human four-year-old.

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[39] A. Gopnik, *et al.,* "Changes in cognitive flexibility and hypothesis search across human life history from childhood to adolescence to adulthood," *Proc. Nat. Acad. Sci.,* 114:30, 7892-99 (2017).

[40] L. Schulz, "The origins of Inquiry: Inductive inference and exploration in early childhood," *Trends Cog. Sci.,* 16:7, 382-89 (2012).

[41] A. Gopnik, *The Gardener and the Carpenter* (New York: Farrar, Straus & Giroux, 2016), chaps. 4 and 5.

Peter Galison's *focus as a science historian is—speaking roughly—on the intersection of theory with experiment.*

"For quite a number of years I have been guided in my work by the odd confrontation of abstract ideas and extremely concrete objects," he once told me, in explaining how he thinks about what he does. At the Washington, Connecticut, meeting he discussed the Cold War tension between engineers (like Wiener) and the administrators of the Manhattan Project (like Oppenheimer: "When [Wiener] warns about the dangers of cybernetics, in part he's trying to compete against the kind of portentous language that people like Oppenheimer [used]: 'When I saw the explosion at Trinity, I thought of the Bhagavad Gita—I am death, destroyer of worlds.' That sense, that physics could stand and speak to the nature of the universe and airforce policy, was repellent and seductive. In a way, you can see that over and over again in the last decades—nanosciences, recombinant DNA, cybernetics: 'I stand reporting to you on the science that has the promise of salvation and the danger of annihilation—and you should pay attention, because this could kill you.' It's a very seductive narrative, and it's repeated in artificial intelligence and robotics."

As a twenty-four-year old, when I first encountered Wiener's ideas and met his colleagues at the MIT meeting I describe in the book's Introduction, I was hardly interested in Wiener's warnings or admonitions. What drove my curiosity was the stark, radical nature of his view of life, based on the mathematical theory of communications in which the message was nonlinear: According to Wiener, "new concepts of communication and control involved a new interpretation of man, of man's knowledge of the universe, and of society." And that led to my first book, which took information theory—the mathematical theory of communications—as a model for all human experience.

In a recent conversation, Peter told me he was beginning to write a book—about building, crashing, and thinking—that considers the black-box nature of cybernetics and how it represents what he thinks of as "the fundamental transformation of learning, machine learning, cybernetics, and the self."

ALGORISTS DREAM OF OBJECTIVITY

Peter Galison

***Peter Galison** is a science historian, Joseph Pellegrino University Professor and co-founder of the Black Hole Initiative at Harvard University, and the author of* Einstein's Clocks and Poincaré's Maps: Empires of Time.

In his second-best book, the great medieval mathematician al-Khwarizmi described the new place-based Indian form of arithmetic. His name, soon sonically linked to "algorismus" (in late medieval Latin) came to designate procedures acting upon numbers—eventually wending its way through "algorithm," (on the model of "logarithm"), into French and on into English. But I like the idea of a modern algorist, even if my spellcheck does not. I mean by it someone profoundly suspicious of the intervention of human judgment, someone who takes that judgment to violate the fundamental norms of what it is to be objective (and therefore scientific).

Near the end of the 20th century, a paper by two University of Minnesota psychologists summarized a vast literature that had long roiled the waters of prediction. One side, they judged, had for all too long held resolutely—and ultimately unethically—to the "clinical method" of prediction, which prized all that was *subjective*: "informal," "in-the-head," and "impressionistic." These clinicians were people (so said the psychologists) who thought they could study their subjects with meticulous care, gather in committees, and make judgment-based predictions about criminal recidivism, college success, medical outcomes, and the like. The other side, the psychologists continued, embodied everything the clinicians did not, embracing the *objective*: "formal," "mechanical," "algorithmic." This the authors took to stand at the root of the whole triumph of post-Galilean science. Not only did science benefit from the actuarial; to a great extent, science *was* the mechanical-actuarial. Breezing through 136 studies of predictions, across domains from sentencing to psychiatry, the authors showed that in 128 of them, predictions using actuarial tables, a multiple-regression equation, or an algorithmic judgment equalled or exceeded in accuracy those using the subjective approach.

They went on to catalog seventeen fallacious justifications for clinging to the clinical. There were the self-interested foot-draggers who feared losing their jobs to machines. Others lacked the education to follow statistical arguments. One group mistrusted the formalization of mathematics; another excoriated what they took to be the actuarial "dehumanizing;" yet others said that the aim was to understand, not to predict. But whatever the motivations, the review concluded that it was downright immoral to withhold the power of the objective over the subjective, the algorithmic over expert judgment.[42]

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[42] William M. Grove & Paul E. Meehl, "Comparative efficiency of informal (subjective, impressionistic) and formal (mechanical, algorithmic) prediction procedures: The Clinical-Statistical Controversy," *Psychology, Public Policy, and Law*, 2:2, 293-323 (1996).

The algorist view has gained strength. Anne Milgram served as Attorney General of the State of New Jersey from 2007 to 2010. When she took office, she wanted to know who the state was arresting, charging, and jailing, and for what crimes. At the time, she reports in a later TED Talk, she could find almost no data or analytics. By imposing statistical prediction, she continues, law enforcement in Camden during her tenure was able to reduce murders by 41 percent, saving thirty-seven lives, while dropping the total crime rate by 26 percent. After joining the Arnold Foundation as its vice president for criminal justice, she established a team of data scientists and statisticians to create a risk-assessment tool; fundamentally, she construed the team's mission as deciding how to put "dangerous people" in jail while releasing the non-dangerous. "The reason for this," Milgram contended, "is the way we make decisions. Judges have the best intentions when they make these decisions about risk, but they're making them subjectively. They're like the baseball scouts twenty years ago who were using their instinct and their experience to try to decide what risk someone poses. They're being subjective, and we know what happens with subjective decision making, which is that we are often wrong." Her team established nine-hundred-plus risk factors, of which nine were most predictive. The questions, the most urgent questions, for the team were: Will a person commit a new crime? Will that person commit a violent act? Will someone come back to court? We need, concluded Milgram, an "objective measure of risk" that should be inflected by judges' judgment. We know the algorithmic statistical process works. That, she says, is "why Google is Google" and why moneyball wins games.[43]

Algorists have triumphed. We have grown accustomed to the idea that protocols and data can and should guide us in everyday action, from reminders about where we probably want to go next, to the likely occurrence of crime. By now, according to the literature, the legal, ethical, formal, and economic dimensions of algorithms are all quasi-infinite. I'd like to focus on one particular siren song of the algorithm: its promise of objectivity.

Scientific objectivity has a history. That might seem surprising. Isn't the notion—expressed above by the Minnesota psychologists—right? Isn't objectivity co-extensive with science itself? Here it's worth stepping back to reflect on all the epistemic virtues we might value in scientific work. Quantification seems like a good thing to have; so, too, do prediction, explanation, unification, precision, accuracy, certainty, and pedagogical utility. In the best of all possible worlds these epistemic virtues would all pull in the same direction. But they do not—not any more than our ethical virtues necessarily coincide. Rewarding people according to their need may very well conflict with rewarding people according to their ability. Equality, fairness, meritocracy—ethics, in a sense, is all about the adjudication of conflicting goods. Too often we forget that this conflict exists in science, too. Design an instrument to be as sensitive as possible and it often fluctuates wildly, making repetition of a measurement impossible.

"Scientific objectivity" entered both the practice and the nomenclature of science after the first third of the 19th century. One sees this clearly in the scientific atlases that provided scientists with the basic objects of their specialty: There were (and are) atlases of the hand, atlases of the skull, atlases of clouds, crystals, flowers, bubble-chamber pictures, nuclear emulsions, and diseases of the eye. In the 18th century, it was obvious that you would not depict this particular, sun-scorched, caterpillar-chewed clover found outside your house in an atlas. No, you aimed—if you were a genius natural philosopher like Goethe, Albinus, or Cheselden—to observe nature but then to perfect the object in question, to abstract it visually to the ideal. Take a skeleton, view it through a camera lucida, draw it with care. Then correct the "imperfections." The advantage of this parting of the curtains of mere experience was clear: It provided a universal guide, one not attached to the vagaries of individual variation.

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[43] TED Talk, January 2014, https://www.ted.com/speakers/anne_milgram.

As the sciences grew in scope, and scientists grew in number, the downside of idealization became clearer. It was one thing to have Goethe depict the "ur-plant" or "ur-insect." It was quite another to have a myriad of different scientists each fixing their images in different and sometimes contradictory ways. Gradually, from around the 1830s forward, one begins to see something new: a claim that the image making was done with a minimum of human intervention, that protocols were followed. This could mean tracing a leaf with a pencil or pressing it into ink that was transferred to the page. It meant, too, that one suddenly was proud of depicting the view through a microscope of a natural object even with its imperfections. This was a radical idea: snowflakes shown without perfect hexagonal symmetry, color distortion near the edge of a microscope lens, tissue torn around the edges in the process of its preparation.

Scientific objectivity came to mean that our representations of things were executed by holding back from intervention—even if it meant reproducing the yellow color near the edge of the image under the microscope, despite the fact that the scientist *knew* that the discoloration was from the lens, not a feature of the object of inquiry. The advantage of objectivity was clear: It superseded the desire to see a theory realized or a generally accepted view confirmed. But objectivity came at a cost. You lost that precise, easily teachable, colored, full depth-of-field, artist's rendition of a dissected corpse. You got a blurry, bad depth-of-field, black-and-white photograph that no medical student (nor even many medical colleagues) could use to learn and compare cases. Still, for a long stretch of the 19th century, the virtue of hands-off, self-restraining objectivity was on the rise.

Starting in the 1930s, the hardline scientific objectivity in scientific representation began running into trouble. In cataloging stellar spectra, for example, no algorithm could compete with highly trained observers who could sort them with far greater accuracy and replicability than any purely rule-following procedure. By the late 1940s, doctors had begun learning how to read electroencephalograms. Expert judgment was needed to sort out different kinds of seizure readings, while none of the early attempts to use frequency analysis could match that judgment. Solar magnetograms—mapping the magnetic fields across the sun—required the trained expert to pry the real signal from artifacts that emerged from the measuring instruments. Even particle physicists recognized that they could not program a computer to sort certain kinds of tracks into the right bins; judgment, trained judgment, was needed.

There should be no confusion here: This was not a return to the invoked genius of an 18th-century idealizer. No one thought you could train to be a Goethe who alone among scientists could pick out the universal, ideal form of a plant, insect, or cloud. Expertise could be learned—you could take a course to learn to make expert judgments about electroencephalograms, stellar spectra, or bubble-chamber tracks; alas, no one has ever thought you could take a course that would lead to the mastery of exceptional insight. There can be no royal road to becoming Goethe. In scientific atlas after scientific atlas, one sees explicit argument that "subjective" factors had to be part of the scientific work needed to create, classify, and interpret scientific images.

What we see in so many of the algorists' claims is a tremendous desire to find scientific objectivity precisely by abandoning judgment and relying on mechanical procedures—in the name of scientific objectivity. Many American states have legislated the use of sentencing and parole algorithms. Better a machine, it is argued, than the vagaries of a judge's judgment.

So here is a warning from the sciences. Hands-off algorithmic proceduralism did indeed have its heyday in the 19th century, and of course still plays a role in many of the most successful technical and scientific endeavors. But the idea that mechanical objectivity, construed as binding self-restraint, follows a simple, monotonic curve increasing from the bad impressionistic clinician to the good externalized actuary simply does not answer to the more interesting and nuanced history of the sciences.

There is a more important lesson from the sciences. Mechanical objectivity is a scientific virtue among others, and the hard sciences learned that lesson often. We must do the same in the legal and social scientific domains. What happens, for example, when the secret, proprietary algorithm sends one person to prison for ten years and another for five years, for the same crime? Rebecca Wexler, visiting fellow at the Yale Law School Information Society Project, has explored that question, and the tremendous cost that trade-secret algorithms impose on the possibility of a fair legal defense.[44] Indeed, for a variety of reasons, law enforcement may not want to share the algorithms used to make DNA, chemical, or fingerprint identifications, which puts the defense in a much weakened position to make its case. In the courtroom, objectivity, trade secrets, and judicial transparency may pull in opposite directions. It reminds me of a moment in the history of physics. Just after World War II, the film giants Kodak and Ilford perfected a film that could be used to reveal the interactions and decays of elementary particles. The physicists were thrilled, of course—until the film companies told them that the composition of the film was a trade secret, so the scientists would never gain complete confidence that they understood the processes they were studying. Proving things with unopenable black boxes can be a dangerous game for scientists, and doubly so for criminal justice.

Other critics have underscored how perilous it is to rely on an accused (or convicted) person's address or other variables that can easily become, inside the black box of algorithmic sentencing, a proxy for race. By dint of everyday experience, we have grown used to the fact that airport security is different for children under the age of twelve and adults over the age of seventy-five. What factors do we want the algorists to have in their often hidden procedures? Education? Income? Employment history? What one has read, watched, visited, or bought? Prior contact with law enforcement? How do we want algorists to weight those factors? Predictive analytics predicated on mechanical objectivity comes at a price. Sometimes it may be a price worth paying; sometimes that price would be devastating for the just society we want to have.

More generally, as the convergence of algorithms and Big Data governs a greater and greater part of our lives, it would be well worth keeping in mind these two lessons from the history of the sciences: Judgment is not the discarded husk of a now pure objectivity of self-restraint. And mechanical objectivity is a virtue competing among others, not the defining essence of the scientific enterprise. They are lessons to bear in mind, even if algorists dream of objectivity.

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[44] Rebecca Wexler, "Life, Liberty, and Trade Secrets: Intellectual Property in the Criminal Justice System," 70 *Stanford Law Review,* XXX (2018).

In the past decade, genetic engineering has caught up with computer science with regard to how new scientific initiatives are shaping our lives. Genetic engineer **George Church**, *a pioneer of the revolution in reading and writing biology, is central to this new landscape of ideas. He thinks of the body as an operating system, with engineers taking the place of traditional biologists in retooling stripped-down components of organisms (from atoms to organs) in much the same vein as in the late 1970s, when electrical engineers were working their way to the first personal computer by assembling circuit boards, hard drives, monitors, etc. George created and is director of the Personal Genome Project, which provides the world's only open-access information on human genomic, environmental, and trait data (GET) and sparked the growing DNA ancestry industry.*

He was instrumental in laying the groundwork for President Obama's 2013 BRAIN (Brain Research through Advancing Innovative Neurotechnologies) Initiative—in aid of improving the brains of human beings to the point where, for much of what sustains us, we might not need the help of (potentially dicey) AIs. "It could be that some of the BRAIN Initiative projects allow us to build human brains that are more consistent with our ethics and capable of doing advanced tasks like artificial intelligence," George has said. "The safest path by far is getting humans to do all the tasks that they would like to delegate to machines, but we're not yet firmly on that super-safe path."

More recently, his crucially important pioneering use of the enzyme CRISPR (as well as methods better than CRISPR) to edit the genes of human cells is sometimes missed by the media in the telling of the CRISPR origins story.

George's attitude toward future forms of artificial general intelligence is friendly, as evinced in the essay that follows. At the same time, he never loses sight of the AI-safety issue. On that subject, he recently remarked: "The main risk in AI, to my mind, is not so much whether we can mathematically understand what they're thinking; it's whether we're capable of teaching them ethical behavior. We're barely capable of teaching each other ethical behavior."

THE RIGHTS OF MACHINES

George M. Church

***George M. Church** is Robert Winthrop Professor of Genetics at Harvard Medical School; Professor of Health Sciences and Technology, Harvard-MIT; and co-author (with Ed Regis) of* Regenesis: How Synthetic Biology Will Reinvent Nature and Ourselves.

In 1950, Norbert Wiener's *The Human Use of Human Beings* was at the cutting edge of vision and speculation in proclaiming that

> the machine like the djinnee, which can learn and can make decisions on the basis of its learning, will in no way be obliged to make such decisions as we should have made, or will be acceptable to us. . . . Whether we entrust our decisions to machines of metal, or to those machines of flesh and blood which are bureaus and vast laboratories and armies and corporations, . . . [t]he hour is very late, and the choice of good and evil knocks at our door.

But this was his book's denouement, and it has left us hanging now for sixty-eight years, lacking not only prescriptions and proscriptions but even a well-articulated "problem statement." We have since seen similar warnings about the threat of our machines, even in the form of outreach to the masses, via films like *Colossus: The Forbin Project* (1970), *The Terminator* (1984), *The Matrix* (1999), and *Ex Machina* (2015). But now the time is ripe for a major update, with fresh, new perspectives—notably focused on generalizations of our "human" rights and our existential needs.

Concern has tended to focus on "us versus them [robots]" or "grey goo [nanotech]" or "monocultures of clones [bio]." To extrapolate current trends: What if we could make or grow almost anything and engineer any level of safety and efficacy desired? Any thinking being (made of any arrangement of atoms) could have access to any technology.

Probably we should be less concerned about us-versus-them and more concerned about the rights of all sentients in the face of an emerging unprecedented diversity of minds. We should be harnessing this diversity to minimize global existential risks, like supervolcanoes and asteroids.

But should we say "should"? (Disclaimer: In this and many other cases, when a technologist describes a societal path that "could," "would," or "should" happen, this doesn't necessarily equate to the preferences of the author. It could reflect warning, uncertainty, and/or detached assessment.) Roboticist Gianmarco Veruggio and others have raised issues of roboethics since 2002; the U.K. Department of Trade and Industry and the RAND spin-off Institute for the Future have raised issues of robot rights since 2006.

"Is versus ought"

It is commonplace to say that science concerns "is," not "ought." Stephen Jay Gould's "non-overlapping magisteria" view argues that facts must be completely distinct from values. Similarly, the 1999 document *Science and Creationism* from the U.S. National Academy of Sciences noted that "science and religion occupy two separate realms." This division has been critiqued by evolutionary biologist Richard Dawkins, myself, and others. We can discuss "should" if framed as "we should do X in order to achieve Y." Which Y should be a high priority is not necessarily settled by democratic vote but might be settled by Darwinian vote. Value systems and religions wax and wane, diversify, diverge, and merge just as living species do: subject to selection. The ultimate "value" (the "should") is survival of genes and memes.

Few religions say that there is no connection between our physical being and the spiritual world. Miracles are documented. Conflicts between Church doctrine and Galileo and Darwin are eventually resolved. Faith and ethics are widespread in our species and can be studied using scientific methods, including but not limited to fMRI, psychoactive drugs, questionnaires, et cetera.

Very practically, we have to address the ethical rules that should be built in, learned, or probabilistically chosen for increasingly intelligent and diverse machines. We have a whole series of trolley problems. At what number of people in line for death should the computer decide to shift a moving trolley to one person? Ultimately this might be a deep-learning problem—one in which huge databases of facts and contingencies can be taken into account, some seemingly far from the ethics at hand.

For example, the computer might infer that the person who would escape death if the trolley is left alone is a convicted terrorist recidivist loaded up with doomsday pathogens, or a saintly POTUS—or part of a much more elaborate chain of events in detailed alternative realities. If one of these problem descriptions seems paradoxical or illogical, it may be that the authors of the trolley problem have adjusted the weights on each sides of the balance such that hesitant indecision is inevitable.

Alternatively, one can use misdirection to rig the system, such that the error modes are not at the level of attention. For example, in the Trolley Problem, the real ethical decision was made years earlier when pedestrians were given access to the rails—or even before that, when we voted to spend more on entertainment than on public safety. Questions that at first seem alien and troubling, like "Who owns the new minds, and who pays for their mistakes?" are similar to well-established laws about who owns and pays for the sins of a corporation.

The Slippery Slopes

We can (over)simplify ethics by claiming that certain scenarios won't happen. The technical challenges or the bright red lines that cannot be crossed are reassuring, but the reality is that once the benefits seem to outweigh the risks (even briefly and barely), the red lines shift. Just before Louise Brown's birth in 1978, many people were worried that she "would turn out to be a little monster, in some way, shape or form, deformed, something wrong with her."[45] Few would hold this view of in-vitro fertilization today.

What technologies are lubricating the slope toward multiplex sentience? It is not merely deep machine-learning algorithms with Big Iron. We have engineered rodents to be significantly better at a variety of cognitive tasks as well as to exhibit other relevant traits, such as persistence and low anxiety. Will this be applicable to animals that are already at the door of humanlike intelligence? Several show self-recognition in a mirror test—chimpanzees, bonobos, orangutans, some dolphins and whales, and magpies.

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[45] "Then, Doctors 'All Anxious' About Test-tube Baby"
http://edition.cnn.com/2003/HEALTH/parenting/07/25/cnna.copperman/

Even the bright red line for human manipulation of human beings shows many signs of moving or breaking completely. More than 2,300 approved clinical trials for gene therapy are in progress worldwide. A major medical goal is the treatment or prevention of cognitive decline, especially in light of our rapidly aging global demographic. Some treatments of cognitive decline will include cognitive enhancements (drugs, genes, cells, transplants, implants, and so on). These will be used off-label. The rules of athletic competition (e.g., banning augmentation with steroids or erythropoietin) do not apply to intellectual competition in the real world. Every bit of progress on cognitive decline is in play for off-label use.

Another frontier of the human use of humans is "brain organoids." We can now accelerate developmental biology. Processes that normally take months can happen in four days in the lab using the right recipes of transcription factors. We can make brains that, with increasing fidelity, recapitulate the differences between people born with aberrant cognitive abilities (e.g., microcephaly). Proper vasculature (veins, arteries, and capillaries) missing from earlier successes are now added, enabling brain organoids to surpass the former sub-microliter limit to possibly exceed the 1.2-liter size of modern human brains (or even the 5-liter elephant or 8-liter sperm whale brains).

Conventional Computers versus Bio-electronic Hybrids

As Moore's Law miniaturization approaches its next speed bump (surely not a solid wall), we see the limits of the stochastics of dopant atoms in silicon slabs and the limits of beam-fabrication methods at around 10-nanometer feature size. Power (energy consumption) issues are also apparent: The great Watson, winner of *Jeopardy!*, used 85,000 watts real time, while the human brains were using 20 watts each. To be fair, the human body needs 100 watts to operate and twenty years to build, hence about 6 trillion joules of energy to "manufacture" a mature human brain. The cost of manufacturing Watson-scale computing is similar. So why aren't humans displacing computers?

For one, the *Jeopardy!* contestants' brains were doing far more than information retrieval—much of which would be considered mere distractions by Watson (e.g., cerebellar control of smiling). Other parts allow leaping out of the box with transcendence unfathomable by Watson, such as what we see in Einstein's five *annus mirabilis* papers of 1905. Also, humans consume more energy than the minimum (100 W) required for life and reproduction. People in India use an average of 700 W per person; it's 10,000 W in the U.S. Both are still less than the 85,000 watts Watson uses. Computers can become more like us via neuromorphic computing, possibly a thousandfold. But human brains could get more efficient, too. The organoid brain-in-a-bottle could get closer to the 20 W limit. The idiosyncratic advantages of computers for math, storage, and search, faculties of limited use to our ancestors, could be designed and evolved anew in labs.

Facebook, the National Security Agency, and others are constructing exabyte-scale storage facilities at more than a megawatt and four hectares, while DNA can store that amount in a milligram. Clearly, DNA is not a mature storage technology, but with Microsoft and Technicolor doubling down on it, we would be wise to pay attention. The main reason for the 6 trillion joules of energy required to get a productive human mind is the twenty years required for training.

Even though a supercomputer can "train" a clone of zemself in seconds, the energy cost of producing a mature silicon clone is comparable. Engineering (*Homo*) prodigies might make a small impact on this slow process, but speeding up development and implanting extensive memory (as DNA-exabytes or other means) could reduce duplication time of a bio-computer to close to the doubling time of cells (ranging from eleven minutes to twenty-four hours). The point is that while we may not know what ratio of bio/homo/nano/robo hybrids will be dominant at each step of our accelerating evolution, we can aim for high levels of humane, fair, and safe treatment ("use") of one another.

Bills of Rights date back to 1689 in England. FDR proclaimed the "Four Freedoms"—freedom of speech, freedom of conscience, freedom from fear, and freedom from want. The U.N.'s Universal Declaration of Human Rights in 1948 included the right to life; the prohibition of slavery; defense of rights when violated; freedom of movement; freedom of association, thought, conscience, and religion; social, economic, and cultural rights; duties of the individual to society; and prohibition of use of rights in contravention of the purposes and principles of the United Nations.

The "universal" nature of these rights is not universally embraced and is subject to extensive critique and noncompliance. How does the emergence of non-*Homo*-intelligences affect this discussion? At a minimum, it is becoming rapidly difficult to hide behind vague intuition for ethical decisions—"I know it when I see it" (U.S. Supreme Court Justice Potter Stewart, 1964) or the "wisdom of repugnance" **(**aka "yuck factor," Leon Kass, 1997), or vague appeals to "common sense." As we have to deal with minds alien to us, sometimes quite literal from our viewpoint, we need to be explicit—yea, even algorithmic.

Self-driving cars, drones, stock-market transactions, NSA searches, et cetera, require rapid, pre-approved decision making. We may gain insights into many aspects of ethics that we have been trying to pin down and explain for centuries. The challenges have included conflicting priorities, as well as engrained biological, sociological, and semi-logical cognitive biases. Notably far from consensus in universal dogmas about human rights are notions of privacy and dignity, even though these influence many laws and guidelines.

Humans might want the right to march in to read (and change) the minds of computers to see why they're making decisions at odds with our (*Homo*) instincts. Is it not fair for machines to ask the same of us? We note the growth of movements toward transparency in potential financial conflicts; "open-source" software, hardware, and wetware; the Fair Access to Science and Technology Research Act (FASTR); and the Open Humans Foundation.

In his 1976 book *Computer Power and Human Reason,* Joseph Weizenbaum argued that machines should not replace *Homo* in situations requiring respect, dignity, or care, while others (author Pamela McCorduck and computer scientists like John McCarthy and Bill Hibbard) replied that machines can be more impartial, calm, and consistent and less abusive or mischievous than people in such positions.

Equality

What did the thirty-three-year-old Thomas Jefferson mean in 1776 when he wrote, "We hold these Truths to be self-evident, that all Men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty, and the Pursuit of Happiness"? The spectrum of current humans is vast. In 1776, "Men" did not include people of color or women. Even today, humans born with congenital cognitive or behavioral issues are destined for unequal (albeit in most cases compassionate) treatment—Down syndrome, Tay-Sachs disease, Fragile X syndrome, cerebral palsy, and so on.

And as we change geographical location and mature, our unequal rights change dramatically. Embryos, infants, children, teens, adults, patients, felons, gender identities and gender preferences, the very rich and very poor—all of these face different rights and socioeconomic realities. One path to new mind-types obtaining and retaining rights similar to the most elite humans would be to keep a *Homo* component, like a human shield or figurehead monarch/CEO, signing blindly enormous technical documents, making snap financial, health, diplomatic, military, or security decisions. We will probably have great difficulty pulling the plug, modifying, or erasing (killing) a computer and its memories—especially if it has befriended humans and made spectacularly compelling pleas for survival (as all excellent researchers fighting for their lives would do).

Even Scott Adams, creator of *Dilbert*, has weighed in on this topic, supported by experiments at Eindhoven University in 2005 noting how susceptible humans are to a robot-as-victim equivalent of the Milgram experiments done at Yale beginning in 1961. Given the many rights of corporations, including ownership of property, it seems likely that other machines will obtain similar rights, and it will be a struggle to maintain inequities of selective rights along multi-axis gradients of intellect and ersatz feelings.

Radically Divergent Rules for Humans versus Nonhumans and Hybrids

The divide noted above for intra *Homo sapiens* variation in rights explodes into a riot of inequality as soon as we move to entities that overlap (or will soon) the spectrum of humanity. In Google Street View, people's faces and car license plates are blurred out. Video devices are excluded from many settings, such as courts and committee meetings. Wearable and public cameras with facial-recognition software touch taboos. Should people with hyperthymesia or photographic memories be excluded from those same settings?

Shouldn't people with prosopagnosia (face blindness) or forgetfulness be able to benefit from facial-recognition software and optical character recognition wherever they go, and if them, then why not everyone? If we all have those tools to some extent, shouldn't we all be able to benefit?

These scenarios echo Kurt Vonnegut's 1961 short story "Harrison Bergeron," in which exceptional aptitude is suppressed in deference to the mediocre lowest common denominator of society. Thought experiments like John Searle's Chinese Room and Isaac Asimov's Three Laws of Robotics all appeal to the sorts of intuitions plaguing human brains that Daniel Kahneman, Amos Tversky, and others have demonstrated. The Chinese Room experiment posits that a mind composed of mechanical and *Homo sapiens* parts cannot be conscious, no matter how competent at intelligent human (Chinese) conversation, unless a human can identify the source of the consciousness and "feel" it. Enforced preference for Asimov's First and Second Laws favor human minds over any other mind meekly present in his Third Law, of self-preservation.

If robots don't have exactly the same consciousness as humans, then this is used as an excuse to give them different rights, analogous to arguments that other tribes or races are less than human. Do robots already show free will? Are they already self-conscious? The robots Qbo have passed the "mirror test" for self-recognition and the robots NAO have passed a related test of recognizing their own voice and inferring their internal state of being, mute or not.

For free will, we have algorithms that are neither fully deterministic nor random but aimed at nearly optimal probabilistic decision making. One could argue that this is a practical Darwinian consequence of game theory. For many (not all) games/problems, if we're totally predictable or totally random, then we tend to lose.

What is the appeal of free will anyway? Historically it gave us a way to assign blame in the context of reward and punishment on Earth or in the afterlife. The goals of punishment might include nudging the priorities of the individual to assist the survival of the species. In extreme cases, this could include imprisonment or other restrictions, if Skinnerian positive/negative reinforcement is inadequate to protect society. Clearly, such tools can apply to free will, seen broadly—to any machine whose behavior we'd like to manage.

We could argue as to whether the robot actually experiences subjective qualia for free will or self-consciousness, but the same applies to evaluating a human. How do we know that a sociopath, a coma patient, a person with Williams syndrome, or a baby has the same free will or self-consciousness as our own? And what does it matter, practically? If humans (of any sort) convincingly claim to experience consciousness, pain, faith, happiness, ambition, and/or utility to society, should we deny them rights because their hypothetical qualia are hypothetically different from ours?

The sharp red lines of prohibition, over which we supposedly will never step, increasingly seem to be short-lived and not sensible. The line between human and machines blurs, both because machines become more humanlike and humans become more machine-like—not only since we increasingly blindly follow GPS scripts, reflex tweets, and carefully crafted marketing, but also as we digest ever more insights into our brain and genetic programming mechanisms. The NIH BRAIN Initiative is developing innovative technologies and using these to map out the connections and activity of mental circuitry so as to improve electronic and synthetic neurobiological ware.

Various red lines depend on genetic exceptionalism, in which genetics is considered permanently heritable (although it is provably reversible), whereas exempt (and lethal) technologies, like cars, are for all intents and purposes irreversible due to social and economic forces. Within genetics, a red line makes us ban or avoid genetically modified foods but embrace genetically modified bacteria making insulin, or genetically modified humans—witness mitochondrial therapies approved in Europe for human adults and embryos.

The line for germline manipulation seems less sensible than the usual, practical line drawn at safety and efficacy. Marriages of two healthy carriers of the same genetic disease have a choice between no child of their own, 25-percent loss of embryos via abortion (spontaneous or induced), 80-percent loss via in-vitro fertilization, or potential zero-percent embryo loss via sperm (germline) engineering. It seems premature to declare this last option unlikely.

For "human subject research," we refer to the 1964 Declaration of Helsinki, keeping in mind the 1932-1972 Tuskegee syphilis experiment, possibly the most infamous biomedical research study in U.S. history. In 2015, the Nonhuman Rights Project filed a lawsuit with the New York State Supreme Court on behalf of two chimpanzees kept for research by Stony Brook University. The appellate court decision was that chimps are not to be treated as legal persons since they "do not have duties and responsibilities in society," despite Jane Goodall's and others' claim that they do, and despite arguments that such a decision could be applied to children and the disabled.[46]

What prevents extension to other animals, organoids, machines, and hybrids? As we (e.g., Hawking, Musk, Tallinn, Wilczek, Tegmark) have promoted bans on "autonomous weapons," we have demonized one type of "dumb" machine, while other machines—for instance, those composed of many *Homo sapiens* voting—can be more lethal and more misguided.

Do transhumans roam the Earth already? Consider the "uncontacted peoples," such as the Sentinelese and Andamanese of India, the Korowai of Indonesia, the Mashco-Piro of Peru, the Pintupi of Australia, the Surma of Ethiopia, the Ruc of Vietnam, the Ayoreo-Totobiegosode of Paraguay, the Himba of Namibia, and dozens of tribes in Papua New Guinea. How would they or our ancestors respond? We could define "transhuman" as people and culture not comprehensible to humans living in a modern, yet un-technological culture.

Such modern Stone Age people would have great trouble understanding why we celebrate the recent LIGO gravity-wave evidence supporting the hundred-year-old general theory of relativity. They would scratch their heads as to why we have atomic clocks, or GPS satellites so we can find our way home, or why and how we have expanded our vision from a narrow optical band to the full spectrum from radio to gamma. We can move faster than any other living species; indeed, we can reach escape velocity from Earth and survive in the very cold vacuum of space.

If those characteristics (and hundreds more) don't constitute transhumanism, then what would? If we feel that the judge of transhumanism should not be fully paleo-culture humans but recent humans, then how would we ever reach transhuman status? We "recent humans" may always be capable of comprehending each new technological increment—never adequately surprised to declare arrival at a (moving) transhuman target. The science-fiction prophet William Gibson said, "The future is already here—it's just not very evenly distributed." While this underestimates the next round of "future," certainly millions of us are transhuman already—with most of us asking for more. The question "What was a human?" has already transmogrified into "What were the many kinds of transhumans?. . . And what were their rights?"

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[46] https://www.nbcnews.com/news/us-news/lawyer-denying-chimpanzees-rights-could-backfire-disabled-n734566.

Caroline A. Jones' *interest in modern and contemporary art is enriched by a willingness to delve into the technologies involved in its production, distribution, and reception. "As an art historian, a lot of my questions are about what kind of art we can make, what kind of thought we can make, what kind of ideas we can make that could stretch the human beyond our stubborn, selfish, 'only concerned with our small group' parameters. The philosophers and philosophies I'm drawn to are those that question the Western obsession with individualism. Those are coming from so many different places, and they're reviving so many different kinds of questions and problems that were raised in the 1960s."*

She has recently turned her attention to the history of cybernetics. Her MIT course, "Automata, Automatism, Systems, Cybernetics," explores the history of the human/machine interface in terms of feedback, exploring the cultural rather than engineering uptake of this idea. She begins with primary readings by Wiener, Shannon, and Turing and then pivots from the scientists and engineers to the work and ideas of artists, feminists, postmodern theorists. Her goal: to come up with a new central paradigm of evolution that's culture-based—"communalism and interspecies symbiosis rather than survival of the fittest."

As a historian, Caroline draws a distinction between what she has termed "left cybernetics" and "right cybernetics": "What do I mean by left cybernetics? In one sense, it's a pun or a joke: the cybernetics that was 'left' behind. On another level, it's a vague political grouping connoting our Left Coast: California, Esalen, the group that Dave Kaiser calls the 'hippie physicists.' It's not an adequate term, but it's a way of recognizing that there was a group beholden to the military-industrial complex, sometimes very unhappily, who gave us the tools to critique it."